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# THE NORTHWEST TERRITORIES

ADMINISTRATION. RESOURCES, DEVELOPMENT



BUREAU OF NORTHWEST TERRITORIES AND YUKON AFFAIRS

LANDS, PARKS AND FORESTS BRANCH

OTTAWA

1943









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DEPARTMENT OF MINES AND RESOURCES

THE NORTHWEST TERRITORIES

Administration - Resources - Development

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## INTRODUCTION

The Northwest Territories of Canada continue to be a source of increasing interest. This vast region embraces the mainland portion of the Dominion lying north of the 60th parallel of latitude between Hudson Bay on the east and Yukon Territory on the west, together with the islands lying between the mainland of Canada and the North Pole including those in Hudson Bay, James Bay, and Hudson Strait. The total area of the Northwest Territories is 1,309,682 square miles, or approximately two-fifths of the total area of the Dominion. According to the 1941 census, the population of the Territories, including whites, Indians, and Eskimos, was 12,028.

For purposes of organization and administration, the Northwest Territories are divided into three districts: Mackenzie, Keewatin, and Franklin. Mackenzie District includes that part of the mainland lying between the 102nd meridian of longitude and Yukon Territory. Keewatin District includes that part of the mainland, with the exception of Boothia and Melville Peninsulas, lying between Mackenzie District and Hudson Bay, together with all islands in Hudson and James Bays. Franklin District includes Boothia and Melville Peninsulas and the islands in Hudson Strait and in the Arctic Archipelago, except those adjacent to the coast of Yukon Territory.

Until 1920, the fur trade was the only industry of any significance in the Territories. Oil was struck that year below Fort Norman on Mackenzie River, and the attention of prospectors was directed northward beyond the provinces. The discovery of radium-bearing and silver ores on the shores of Great Bear Lake in 1930 created world-wide interest, which was intensified by gold and silver finds near the mouth of Yellowknife River on the northern shores of Great Slave Lake in 1935. Geological surveys carried on by the Department of Mines and Resources have disclosed the presence of many other minerals, and in a little more than two decades the economic picture of the Territories has changed.

At present a full line of petroleum products is available at Norman Wells. Ores producing radium and related products, as well as silver, are being mined at Great Bear Lake. Mines in the vicinity of Yellowknife produced gold valued at more than \$3,700,000 in 1942. Hydro-electric power has been developed to serve this field. There is a progressive community of about 850 people in the Yellowknife mining district. Much of the progress made may be attributed to the development of transportation by air which has overcome the great distances of the north and brought the Territories within a few hours flying time of the centres of population in the Provinces.

In the following pages will be found some particulars concerning the administration, resources, and development of the Northwest Territories which it is hoped will be of interest and service to those desiring a general knowledge of the region. Additional information may be obtained from the Bureau of Northwest Territories and Yukon Affairs, Lands, Parks and Forests Branch, Department of Mines and Resources, Ottawa, Canada.







## GOVERNMENT AND ADMINISTRATION

The Northwest Territories Act (Chapter 142 R.S.C. 1927) provides for a Territorial Government composed of the Commissioner of the Northwest Territories, the Deputy Commissioner and five councillors appointed by the Governor General in Council. The Commissioner in Council has power to make ordinances for the Government of the Territories under instructions from the Governor General in Council or the Minister of Mines and Resources, respecting direct taxation within the Territories in order to raise revenues, etc., and in respect to the establishment and tenure of territorial offices; the appointment and payment of officers, maintenance of prisons, municipal institutions, licences, solemnization of marriages, property and civil rights, administration of justice; and generally to all matters of a local or private nature in the Territories. The seat of Government is at Ottawa.

The Northwest Territories Council is now composed as follows:

Commissioner.....	Charles Camsell
Deputy Commissioner.....	R. A. Gibson
Member of Council.....	A. L. Cumming
" " "	K. R. Daly
" " "	H. L. Keenleyside
" " "	H. W. McGill
" " "	S. T. Wood
Secretary.....	D. L. McKeand

The Council meets whenever circumstances warrant. It functions not only as a legislative body, but in an advisory capacity to the Minister of Mines and Resources on matters pertaining to the administration of the Northwest Territories. Careful consideration is given to matters affecting the well-being of the resident population, white and native. Appreciation of the fact that natives must, by reason of character, training, and environment, depend almost entirely on hunting and trapping for a livelihood is reflected in the provisions of the game regulations and in the large areas set aside as game sanctuaries and native game preserves.

The administration of the various Acts, Ordinances, and Regulations pertaining to the Northwest Territories is supervised by the Director of the Lands, Parks and Forests Branch, Department of Mines and Resources. The Director, who is also Deputy Commissioner of the Northwest Territories and Registrar General of Vital Statistics, has his office at 150 Wellington Street, Ottawa, Canada. The administrative office for the Mackenzie District is at Fort Smith. A medical officer at Aklavik acts as Departmental Agent for the lower Mackenzie and Western Arctic. The main office for the transaction of mining business is at Yellowknife.

The enforcement of law and order is the responsibility of the Royal Canadian Mounted Police and detachments are established at strategic points throughout the Territories. By means of extensive patrols, both in winter and summer, a reasonably close check is kept on a very large region by a comparatively small body of men. As might be expected, their duties are numerous and varied.



## PUBLIC WELFARE

The welfare of the Indians, Eskimos, and the indigent white and half-breed population of the Northwest Territories is a responsibility of the Department of Mines and Resources, and officers of the Department are stationed in the principal settlements in the Mackenzie District and in the Eastern Arctic.

### Medical Services

Hospitals and schools are operated in the Territories by missions of both the Church of England in Canada and the Roman Catholic Church. There are seven well-equipped mission hospitals in the Mackenzie District and two in the Eastern Arctic. These hospitals have a capacity of from ten to fifty beds each, possess X-ray equipment and surgical facilities, and are in charge of resident doctors and graduate nurses. A small six-cot hospital or nursing home, with a registered nurse in charge, is also operated in connection with the mission day school at Hay River.

The Government of Canada has contributed substantially towards the construction costs of some of the mission hospitals, and also pays the mission a fixed amount per day for each native, indigent white, or half-breed receiving treatment. The doctors are full-time Government employees, and in the Mackenzie District, except at Fort Smith and Aklavik, they are also Indian Agents as well as public health officers for the districts in which they are situated.

Hospitals are operated by Church of England missions at Hay River, Fort Norman, and Aklavik in the Mackenzie District, and at Pangnirtung on Baffin Island in the District of Franklin. Roman Catholic missions operate hospitals at Fort Smith, Fort Resolution, Rae, Fort Simpson, and Aklavik in the Mackenzie District, and at Chesterfield in Keewatin District. A small hospital is operated at Yellowknife by the Consolidated Mining and Smelting Company of Canada, Limited. A resident doctor is maintained there by the company, and he also acts as Government medical health officer. A medical officer is also stationed at the Eldorado Gold Mines Limited property at Great Bear Lake.

The Department of Pensions and National Health at Ottawa serves as a consulting agency in matters of public health, and has undertaken a nutritional study in the Northwest Territories. When necessary, this Department also furnishes advice on sanitation. All Government medical officers in the Territories have recourse to the medical services of the Department of Pensions and National Health in connection with complicated cases or epidemics, and the desired information is usually transmitted by radio. Through the use of short-wave private commercial radio stations at trading centres not served by the Government radio system, residents are able to obtain medical advice in emergencies from the medical officer in the district, or from Ottawa. Occasionally medical supplies are flown into remote areas by aeroplane and dropped by parachute.

A qualified medical officer accompanies the annual patrol of the Eastern Arctic and examines the natives at all points of call.

Dental services are provided by a resident dentist at Yellowknife and by others who visit the Territories from time to time.



### Education

The education of the white, native, and half-breed children in the Mackenzie District is carried on at day and residential schools operated by the missions with financial assistance from the Government, and at public schools established at Fort Smith and Yellowknife. The latter also receive grants from the Government. Residential schools are maintained by the Church of England mission at Aklavik and by the Roman Catholic missions at Fort Resolution, Fort Providence, and Aklavik. There are Roman Catholic mission day schools at Fort Smith and Fort Simpson, and Church of England mission day schools at Hay River and Fort Simpson. In addition to the subjects usually taught in primary schools, special attention is also given to manual and domestic training and to hygiene.

Additional facilities for secondary education are available to residents of the Northwest Territories by means of correspondence courses which have been arranged by educational authorities in Alberta and Ontario.

Eskimo children are also given some education at mission day schools in Eskimo territory. Because of their nomadic tendency, however, Eskimos seldom remain very long at the settlements, and the periods available to the missions for teaching the children are therefore comparatively short.

The Eskimos of the Eastern Arctic use a system of syllabics by means of which they learn to read and write, and also to correspond with each other.

### General Welfare

The occasional scarcity of game and fur in certain districts results in hardship to some of the natives. On such occasions supplies are issued by the Government of Canada through district medical officers, Royal Canadian Mounted Police, traders, or missionaries, in that order of authority. Care is taken, however, that hunters are not relieved of the obligation of providing for their families, otherwise native morale would tend to deteriorate. The establishment of the reindeer industry in the vicinity of the Mackenzie River Delta and the provision of native game preserves might be cited as some of the measures instituted to broaden the basis of subsistence of the natives.



## TRANSPORTATION

### Mackenzie District

The Mackenzie District and Western Arctic are served by water and aerial transportation. There is no highway system in the Territories but truck and tractor roads which have been constructed in the vicinity of settlements and between strategic points facilitate the transportation of freight and supplies.

Inland Water Transportation - The Mackenzie River and its tributaries, the Athabaska and Slave Rivers, provide an inland water transport system for a distance of about 1,700 miles, continuous except for one unnavigable stretch between Fort Fitzgerald, Alberta, and Fort Smith, N.W.T. The head of this transport system is Waterways, Alberta - 300 miles north of Edmonton - and terminus of the Northern Alberta Railways. From Waterways freight and passengers are transported by water to Fort Fitzgerald, where a sixteen-mile portage to Fort Smith, gateway to the Northwest Territories, is necessary to avoid a series of rapids on the Slave River. Supplies and passengers are transferred around this obstruction to the wharves at Fort Smith by motorized equipment over well-constructed dirt roads. From Fort Smith there is uninterrupted navigation to the Arctic Ocean.

Three water transportation companies operate freight boats and barges to all points on the Mackenzie River system, viz. the Mackenzie River Transport (Hudson's Bay Company), Northern Transportation Company, Limited, and Yellowknife Transportation Company, Limited. The two first-named companies maintain passenger boat and dining services. All freight destined for points on the Western Arctic Coast is distributed from Port Brabant (Tuktoyaktuk) at the mouth of the Mackenzie River.

Navigation conditions along the Mackenzie waterway are constantly being improved. Rivers and lakes are marked at many points with buoys, flashlights, beacons, flags, and land markers. Most of the boats are equipped with radio and are in regular communication with the radio stations en route. Canoes are used extensively on the smaller lakes and rivers, particularly by prospectors.

Coastal Services - Until recent years the Western Arctic Coast was served by ocean-going vessels from Pacific Coast seaports via Bering Strait, but for various reasons this service has been discontinued. Vessels operated by the Hudson's Bay Company which connect with Mackenzie River boats at Port Brabant provide a freight service to points along the coast. Limited accommodation for passengers is sometimes available on these vessels. Occasional transportation along the coast may also be obtained on schooners operated by traders and natives.

Aerial Transportation - The aeroplane has contributed greatly to the development that has taken place in the Mackenzie District during the past decade. This form of transportation was first introduced in the Territories during the winter of 1920-21 by Imperial Oil, Limited, and since then extensive exploration of the region has been made by air. This part of Canada is particularly adapted to flying with pontoon or ski-equipped aeroplanes as it is dotted with lakes and traversed by rivers of sufficient size to permit safe landings both in summer and in winter. Recent developments have resulted in the construction of a number of large landing fields which will permit the operation of wheel-equipped aircraft throughout the year. These fields are situated at Fort Smith, Fort Resolution, Hay River, Fort Providence, Fort Simpson, Wrigley, and Norman Wells.

Regular mail, express, freight, and passenger services are maintained the year round to many points in the Territories. A service daily except Sunday



between Edmonton, Fort Smith, Fort Simpson, and Norman Wells, and a tri-weekly service between Edmonton, Fort Smith, and Yellowknife are operated by Canadian Pacific Air Lines, as well as a monthly service north to Fort Good Hope, Arctic Red River, Fort McPherson, and Aklavik on the Mackenzie River. Trips are made weekly by the same company from Yellowknife to Port Radium, and monthly from Yellowknife to Rae. With the exception of that from Edmonton to Norman Wells, these services are suspended for periods of from three to four weeks at 'break-up' and 'freeze-up'. Aircraft are equipped with two-way radio permitting continuous contact with the system of wireless stations established throughout the Territories.

Roads - Two portage roads, interconnected at one-mile intervals, which permit one-way traffic between Fort Fitzgerald and Fort Smith, and a road from Fort Smith to Bell Rock shipyards on Slave River, are maintained in condition for motor traffic. A provincial road from Peace River and Grimshaw, Alberta, to Notikewin, has been extended as a winter truck road to Norman Wells, via Upper Hay River, Alexandra Falls, Fort Providence, and Mills Lake on Mackenzie River. A winter truck road has been constructed from Fort Nelson, B.C. to Fort Simpson, and when ice conditions on the Mackenzie River are favourable, this route connects with that from Grimshaw to Norman Wells. Hay River settlement on Great Slave Lake is accessible from Fort Smith by a winter truck road which has been extended to meet the Grimshaw-Norman road near Alexandra Falls.

#### Eastern Arctic

The Eastern Arctic is served chiefly by R.M.S. "Nascopie", a vessel owned and operated by the Hudson's Bay Company and used by the Government of Canada for the annual Eastern Arctic Patrol of medical centres, Royal Canadian Mounted Police detachments, post offices, radio stations, trading posts, and missions in the region. This vessel was designed to navigate northern waters under all conditions. Auxiliary services are provided to reach other points not served directly by the "Nascopie". Some of these boats operate out of Churchill, Manitoba, making connection with the Hudson Bay Railway. The Hudson's Bay Company, Royal Canadian Mounted Police, and missions also have small sea-going motor boats by means of which they are able to maintain communication with native encampments along the coasts.

Each summer the R.M.S. "Nascopie" sails from some port in Eastern Canada with a party of Government officials for a voyage of more than 10,000 miles to posts in northern Quebec, on islands in Hudson Strait and Hudson Bay, and in the Arctic Archipelago. The party usually includes administrative officers, doctors, Royal Canadian Mounted Police, and others going north to relieve those who have completed their term of service in the Arctic. In normal times, scientific parties and a limited number of tourists also accompany the expedition. Ports of call are visited for inspection, administration of justice, delivery and acceptance of mail, change of personnel, and renewal of supplies. Eskimos frequently are transferred to more abundant hunting grounds. On the northbound journey the vessel calls at Churchill for passengers and supplies arriving by railway. The voyage usually extends over a period of from fourteen to sixteen weeks during which twenty-five to thirty calls are made.

Aids to navigation maintained by the Department of Transport include radio direction-finding and meteorological stations operated the year round and seasonal beacons and buoys in Hudson Strait. A pilot is required for entry into Churchill and native pilots are taken aboard vessels entering Lake Harbour on Baffin Island and Coral Harbour on Southampton Island.



## COMMUNICATION

### Mail Services

#### Mackenzie District

The Mackenzie District of the Northwest Territories receives its mail exclusively by air. Prior to 1930, mail was carried by water in summer and by dog-team in winter. Following some experimental mail-carrying flights in 1929, mail planes were put into service and operated frequently. Later, air mail contracts were let and definite schedules have been maintained for several years. Whereas at one time weeks and months were required to deliver mail, it is now done in a matter of hours. Postage rates have been kept as low as possible, and letters are conveyed by air at regular letter-postage rates, if not overweight. Parcels are subject to a higher rate than those carried by ordinary means of transport.

Fort Smith and Yellowknife enjoy a tri-weekly service summer and winter from Edmonton, Alberta, via Fort McMurray. Fort Resolution, Hay River, Fort Providence, Fort Simpson, Wrigley, Fort Norman, and Norman Wells are served weekly from Edmonton via Fort McMurray and Fort Smith. Fort Good Hope, Arctic Red River, Fort McPherson, and Aklavik in the lower Mackenzie region receive air mail monthly. Port Radium (Eldorado) is served weekly, and Rae monthly, from Yellowknife. Coppermine has a semi-yearly service (January and July). Post offices have been established at all these points.

In addition to the above services, mails may also be carried on commercial planes as circumstances permit.

#### Eastern Arctic

Post offices are located at Chesterfield in Keewatin District, Fort Ross, Lake Harbour, Pangnirtung, and Pond Inlet in Franklin District and Fort Chimo and Port Harrison in northern Quebec. The annual Eastern Arctic Patrol delivers mail to all post offices and arranges for collection and delivery at non-post office points through locally operated auxiliary services.

All classes of mail matter are centralized at Ottawa and the accumulation is carried by the Patrol or in the interim by auxiliary or courtesy services as opportunities arise. This travelling postal service is classified as an accounting post office and is available for post office savings bank transactions, money orders, postal notes, parcel post C.O.D. services, current issues of postage, and war savings stamps. Postal parcels originating in foreign territory addressed to Eastern Arctic residents, and on hand at the office of the Collector of Customs at Ottawa, are released for delivery by the Patrol subject to the collection of all charges.

### Radio Services

Excellent radio services have been maintained in the Northwest Territories since 1925. High-powered stations have been installed by the Departments of National Defence and Transport at strategic points and important settlements in the Mackenzie District and the Eastern and Western Arctic. By this means practically every settlement can be reached by direct



communication or by relaying messages to and from these key positions through licensed private commercial stations.

In the Eastern Arctic the Government radio stations are also direction-finding stations for ocean-going vessels. This combined system of Government stations and licensed stations is also used to get weather reports, to obtain information in emergencies for the treatment of sick people in remote districts where medical services are not available, and to arrange for emergency aeroplane flights when necessary. Many of the Government stations are equipped with radio telephones for communicating with aircraft, river boats, and other stations having low-powered radios. Under direction of the Minister of Mines and Resources news bulletins were transmitted from Edmonton to Mackenzie District stations, but this service has been temporarily suspended owing to war conditions.

Government stations occasionally provide broadcasts of press news and personal messages for the benefit of traders, miners, missionaries, and others within their wave-lengths. For several years the Canadian Broadcasting Corporation has broadcast the "Northern Messenger" program each Friday evening during the winter months. By means of this service relatives and friends are able to send personal messages to residents of the Northwest Territories, and adjacent areas, a privilege greatly appreciated by all concerned.



## CLIMATE

The climate of the Northwest Territories is what might be expected in Arctic and sub-Arctic regions, with the exception that temperatures in the Mackenzie District are more moderate than its latitude would suggest. Charts of summer isotherms show the 55 degrees Fahrenheit line, which passes just a few miles north of Port Arthur, Ontario, as swinging northward to include the Mackenzie Valley as far as Fort Good Hope and the Arctic Circle. The low-lying parts of the region forming the Mackenzie Valley proper are favoured with an exceptionally agreeable climate, which is doubtless influenced by the presence of large bodies of water, the mantle of forest covering the land areas, and the general low altitude of the valley. The summers are remarkable for their long days of sunshine. A three-months period of daylight is experienced in all parts of the Mackenzie District (the twilight continuing throughout the short time the sun is below the horizon) and north of the Arctic Circle the midnight sun is a feature of note. At Fort Simpson, the average possible number of hours of sunshine daily during the whole summer season is nearly eighteen. Owing to these favourable conditions many gardens are cultivated in the district in connection with the missions, Indian agencies, and trading posts.

Precipitation in most parts of the Northwest Territories is not excessive, normally being under ten inches a year, except in the Mackenzie Valley west of Great Slave and Great Bear Lakes, where it is from 10 to 20 inches. The moisture is retained longer than in southerly regions, for the low temperatures reduce the amount of evaporation and the permanently frozen subsoil prevents underground drainage.

There is a marked distinction between the climates of the Eastern and Western Arctic regions of Canada, this distinction being most clearly manifest in July. Along the Arctic Circle the average temperature in July ranges from about 42 degrees Fahrenheit in southern Baffin Island to about 60 degrees Fahrenheit in the lower Mackenzie Valley. On the lower portion of Ellesmere Island the average temperature is less than 40 degrees Fahrenheit and this mean temperature prevails throughout the Parry Islands. If the isotherm of 50 degrees Fahrenheit in July is taken as the criterion of a northern summer, then there is no summer north and east of a line which begins on the Labrador Coast, touches the southern end of Ungava Bay, and passes across Hudson Bay from the Belcher Islands to Eskimo Point, thence northwestward to the mouth of the Coppermine and along the Arctic Coast to the mouth of the Mackenzie.

In midwinter all the Arctic territory is subject to periods of great cold and these periods are associated with the slow outflow of probably shallow, but extremely dry and cold domes of surface air from the region west of the Parry Islands and Victoria Island. These masses move in midwinter up the Mackenzie Valley to spread out over the Canadian prairies before showing much tendency to drift eastward. As the year advances, the eastward component of motion becomes much more important than the southward component so that in midsummer the Eastern Arctic continues to be dominated by wintry conditions, while the Western Arctic is increasingly influenced by air masses modified over Alaska and the north Pacific Ocean. In fact, air masses which have been recently modified in more southerly latitudes of the continent frequently affect the weather of the Western Arctic. As a consequence, the mean annual highest temperature in Baffin Island is about 65 degrees Fahrenheit, whereas on the Arctic Circle in the Mackenzie Valley it is 85 degrees Fahrenheit or higher.



## INDIANS

Most of the 4,000 Indians in the Northwest Territories live in the valley of the Mackenzie River, the principal tribes being the Chipewyan, Beaver, Sekani, Slave, Yellowknife, Dogrib, Hare, Nahani, and Kutchin or Loucheux. The Kutchin Indians, native to the Yukon and Alaska, are found in the Northwest Territories only in the Lower Mackenzie and Peel River regions. They constitute one branch of the Athapaskan stock. The remaining tribes of the Northwest Territories may be regarded as constituting another branch because their languages are mutually intelligible, whereas that of the Kutchin is distinct although obviously related.

Some scientists hold the view that the Athapaskan language, spoken by the Indians throughout the whole basin of the Mackenzie River, belongs to the same family of languages as prevails in China, Tibet, and Siam. Moreover, from the concentration of the Athapaskans in the northwestern part of America, they conclude that these people were the last wanderers to drift from Asia across Bering Strait into the New World, probably towards the beginning of the Christian era. From the Indians themselves, of course, no accurate knowledge can be gained of their origin or early movements. Their oral traditions are quite unreliable, for they combine with impossible fables memories of events which occurred no more than 150 years ago.

The present-day Athapaskan has copied the dwelling and the clothing of the white man. The old-fashioned moccasin, however, holds its ground, though ornamented with beads instead of with porcupine quills; and the old fur or leather mittens, often similarly ornamented, are still preferred to ordinary gloves.

Intertribal raids among the Indians came to an end about a century ago, and they began to congregate about the posts and settlements of the fur-traders who tried, not very successfully, to elevate as chiefs the most influential and reliable hunters and to give them a limited authority over their countrymen. Missionaries have introduced new and larger ideas of life and its purpose that partly supplant, partly coalesce with, the older notions. In consequence, every Indian in the Territories now adheres to the Anglican or the Roman Catholic faith, though he may still harbour many of his old beliefs. In recent years, exploration and settlement along with mining activities, have led to a demand for Indian guides, canoe-men, and packers, and resulted in an increasing dependence on flour, beans, bacon, and other imported foods instead of on the rewards of hunting and fishing. From the earliest times, too, many white traders and trappers have taken Indian women as wives, and more or less consciously have leavened the whole outlook and manners of the tribes among whom they have resided. So great, indeed, has been this intermarriage that today in the whole area there are probably few Indians of pure stock.

Thus, through economic and social changes both the outward and the inward lives of the Indians have altered. Over a long period - most of the 19th century - these changes threatened to bring about the extinction of the race. Alcoholic excesses and diseases previously unknown, particularly smallpox, tuberculosis, and influenza, decimated their ranks and reduced their number from what was estimated by some authorities to be 13,000 to one-third of that total. Nevertheless, the outlook for the future has



become much more promising. It is confidently felt that increasing settlement, and a great development of the resources of the Territories, will open up new avenues of employment for the Indians, lower their heavy infant mortality and, through a general improvement in the living conditions, arouse in them new vigour and new ambitions. Of their ultimate fate there can be little doubt. Within another hundred years they may have become completely absorbed into the white race and will retain but the vaguest memory of their past history.

The Indians of the Northwest Territories depend mostly upon hunting and trapping for a livelihood. Here and there some cultivate small plots of potatoes. They own no cattle or horses, their mode of transportation being by boat along the great waterways in the summer and with dogs in the winter. They catch and preserve large quantities of fish for their own use and for food for the dogs during the winter. They also pick and dry large quantities of wild berries for winter use. They live in log cabins in the winter and in tents and tepees in the summer. Like Indians of other parts of Canada, they are under the care of the Dominion Government and their affairs are administered by the Indian Affairs Branch of the Department of Mines and Resources, Ottawa. The Indian welfare program in the Territories consists in the main of providing and protecting their means of livelihood, the medical care and hospitalization of the sick; the education of the children; the payment of treaty money; the providing of relief rations for the old and physically incapacitated; and the furnishing of supplies and equipment which particular circumstances may require.

Anything that interferes with the success of their hunting and trapping causes hardship and destitution. Special game preserves have been set aside for the exclusive use of Indians and Eskimos, a plan that has proved satisfactory both from the viewpoint of game conservation and as a protection for the natives.

As to matters of health, a fully qualified doctor is in charge of each of the Indian agencies, these being located at Fort Norman, Fort Simpson, and Fort Resolution. In addition doctors appointed by the Northwest Territories Administration and stationed at Fort Smith and Aklavik extend medical services to the Indians in their territories. In the more remote places, medical supplies are provided to missionaries and other laymen who render the best service they can to ailing Indians. In the hospitalization of the sick, full use is made of the hospitals maintained by the Anglican and Roman Catholic Missions at Fort Smith, Fort Resolution, Hay River, Fort Simpson, Fort Norman, Aklavik, and Rae, in return for which grants, based on established per diem rates, are made by the Government to the missions.

To meet the educational needs of Indian children, the Government has established residential and day schools in the Northwest Territories, particulars of which will be found in the section dealing with Education on page 7.



## ESKIMOS

The Eskimos in Canada inhabit the entire Arctic Coast from the Yukon-Alaska Boundary to the eastern limits of Canadian territory, the more southerly islands of the Arctic Archipelago, and some of the islands of Hudson Bay and James Bay. Canada has an Eskimo population of approximately 7,200. About 5,400 Eskimos inhabit the Northwest Territories, and the greater part of these live in the Districts of Franklin and Keewatin. There are also about 1,800 Eskimos in northern Quebec, formerly the Ungava District of the Northwest Territories.

There are no Eskimo tribes as the term "tribe" is associated with North American Indians, but the Eskimos of the Eastern Arctic live and travel in bands or groups of two or more families, and each band or group usually contains some outstanding individual who acts as leader.

Because of this lack of tribal organization and the fact that native Eskimo names are not only difficult to record accurately but are quite often duplicated, the Northwest Territories Administration, Department of Mines and Resources, in 1941 distributed numbered discs to all Eskimos in Canada. This distribution was carried out in conjunction with the decennial census of the Dominion, and to the census record of each Eskimo was added a number corresponding to that on the disc issued to that individual. Through this system of numbers, the Department now has a personal record of each Eskimo. The numbered discs worn by the Eskimos permit positive identification at all times and help overcome difficulties formerly experienced in the identification of an individual whose name, for various reasons, created confusion. The new system of identification also facilitates the administration of affairs relating to the welfare and health of the Eskimos.

Intercourse between the bands is limited mainly to contact with the natives hunting or trapping in adjoining areas. Each band secures its livelihood in its own district, which has no definite boundaries, and bands move about in accordance with the movement of the game and the changing seasons. In bad seasons it may become necessary to look for new hunting grounds, but Eskimos are very likely to return to the old district when they think conditions have improved. The hunting and trapping grounds of Eastern Arctic Eskimos are along the coast, the sea furnishing the greater part of their requirements in food, fuel, and clothing.

Because of outside influences and the shortage of native clothing material, the dress of the Eskimos has undergone some change in recent years, the extent of the change depending on the game resources of the particular district. Summer clothing is cut very much on the same pattern as that for winter. Caribou skin is without doubt the most suitable clothing material for winter travel, being light and warm. In the very cold weather two suits are worn, one with the hair turned in and the other with the hair turned out. In the summer, the clothing is usually made of sealskin or of some cotton goods, such as "moleskin." High sealskin boots or moccasins are worn both summer and winter. The women make most of the clothing and the portable type of sewing machine is a common article of equipment.

The Eskimo of the Eastern Arctic lives in a snowhouse in winter and a tent in summer. Sealskin, canvas, sacking, pieces of board, stone, and even glazed sash may go to make up the tents or houses.



The snow igloo is the typical winter dwelling. It is constructed of blocks cut from the hard-packed snow, and above the first row the blocks are laid spirally to form a dome. It has a low tunnel-like entrance and often several compartments are connected by these tunnels. One section of the igloo floor is higher than the rest and forms the sleeping platform. The stone seal-oil lamps, which are kept burning day and night during cold weather raise the temperature noticeably and make the dwelling quite comfortable. The temperature is partly controlled by enlarging or making smaller the ventilation hole in the roof. Often the igloos are lined with canvas or seal skin to prevent drip.

The nature of the summer and winter dwellings, aside from the wooden or composite-houses, does not restrict the Eskimo's movements to one locality, which is fortunate from the viewpoint of health and sanitation. The Hudson's Bay Company and the Mounted Police frequently provide their native servants with small homes of wooden construction for use as winter residences. These are regularly inspected and kept in a sanitary condition.

Travel in the summer is by boat, and in the winter by dog-team. The usual type of cruising boat is the open whale-boat to which a sail is attached. Other types are also brought in on order by the trading companies and are equipped, when the owners can afford it, with gasoline engines. Eskimos are mechanically-inclined and with a little coaching quickly learn to run, take down, and keep in repair quite complicated marine engines. They know thoroughly the districts in which they hunt and trap, also the actions of the tides, currents, and ice, and go out to see under conditions which would keep many white men ashore. Into these larger boats will crowd three or four families and all their dogs and equipment. The natives seem to travel in the picnic spirit and consider it something of a lark. They may get into serious difficulties, but once the difficulties are overcome they are forgotten.

The smaller, one-man kayak is still used extensively by the Eskimos and is probably the outstanding article of equipment made by these remarkable people. The frame is made of wood strongly laced together with thong. The craft is narrow, is covered with sealskin, and is usually from 15 to 20 feet long. As the deck is also covered with sealskin the kayak is quite seaworthy in the hands of an experienced Eskimo. It is propelled by a double-bladed paddle, and carries all the equipment necessary for the hunting of seals. It is usually towed behind a large boat or hoisted up on the deck when the family or families are on the move.

The sledge or komatik used in the Eastern Arctic will support loads of one thousand pounds or more, depending on the size, and will stand considerable hard usage.

Dog feed is a problem at times and one of the matters in which Eastern Arctic Eskimos are provident. They know that their own livelihood during the long winter months depends in large measure on their dogs. A certain amount of meat is cached away during the late summer, but it is seldom sufficient and may not be readily available. Eskimo dogs are able to go for some time without food and if the hoped for game does not materialize for a few days no harm results. Walrus meat is considered to be the best dog food. Seal meat and some types of fish are also good.



Practically the sole medium of exchange used by the Eskimos in their dealing with traders is the pelt of the white fox. During a good fox year, the Eskimos are enabled to replace their worn-out gear, and satisfy their longing for new goods. The Eskimos do not, as a rule, buy luxuries until they have obtained the essentials they require. In this they are encouraged by the better traders. Very few Eskimos are able to accumulate much in the way of worldly goods or to establish credits at the trading posts; in fact allowing a credit to stand at a trading post is something that the average Eskimo cannot comprehend. The traders, of course, depend entirely on the natives for the pelts they want, and must see that they are looked after in bad times. Seal, walrus, and caribou are also of great importance to the Eskimos. Arctic char (sea trout) is fairly abundant at the mouths of rivers during July and August, and cod may be had in quantity at the right season in certain localities.

The domestic relationships of the Eskimos are usually happy. They are fond of children, but large families are not common, although infant mortality is low. If they have no children of their own they will adopt those of others, caring for them as if they were their own. They also accept without visible or audible protest the responsibility of looking after their aged and otherwise dependent relatives. A refusal to continue to furnish food to those in want, even though the needy ones show little tendency to go out and hunt for themselves, is likely to be frowned upon by the rest of the band.

The Eskimos are quite trustworthy and are invaluable companions in Arctic travel. As employees of white men, they are likely to obey orders without question even though they think the orders are bad. This sometimes results in misunderstanding on the part of white men unfamiliar with this trait of Eskimo character, and who are not very specific in giving their orders.

Both men and women are intelligent, quick to imitate or learn and with a mechanical turn of mind that permits them to take advantage rapidly of mechanical power and labour-saving devices. Their outlook on life is cheerful, and their dispositions are friendly. The type of habitation depends upon local and seasonal conditions. Wherever possible they have "permanent" homes, in which they reside in winter. They use drift wood for fuel and for the building of one-roomed log houses.

The duties of the Eskimo women are arduous and varied. They must pitch the tents when a new campsite is occupied; cook the meals; scrape and dress skins for clothing, harness and lines; make the clothing for the family, and keep it in repair. On the men falls the responsibility of keeping the family supplied with food and the skins out of which clothing may be made. They must also secure the fox pelts so that trade goods may be obtained from the posts. Much of their time is spent hunting seals, the staff of life of the Eskimos. During the summer when seals can be hunted from kayaks this does not usually entail very much hardship and possibly gives the Eskimos considerable pleasure. During the remainder of the year, when the seals are obtained at the floe edge or at "breathing holes" in the ice, it calls for the exercise of considerable patience and ingenuity under very trying conditions. The walrus is usually hunted in the water from the larger boats or on land. Although most Eskimos have a walrus or seal harpoon, the rifle is commonly used.



Caribou hunts are arranged in the autumn particularly for the hides which are required for winter clothing. In the Eastern Arctic it is usually necessary to go some distance inland for caribou and two months or more may be spent in travelling and hunting. Dogs are taken along to help "pack" the meat and hides. A good pack-dog can carry a load of 35 to 40 pounds. When there are any surplus hides or meat they are cached under rocks and picked up when winter travel with sledges is possible.

In the Western Arctic the Eskimos spend most of their time along the coast, but go inland on hunting expeditions, chiefly for caribou. On the coast there is a short season of open water in midsummer, but for eight months of the year the sea is frozen over, and thus the Arctic Ocean itself provides a happy hunting ground for the Eskimo over which he travels and lives as if it were solid ground.

On the coast the Eskimos move out on the ice to sealing grounds, and it is then that many of them use the snow-house. These sealing camps may be from 5 to 20 miles out on the ice and are frequently used as bases for trapping operations. The summer existence of the Eskimos depends largely upon their prosperity and to a lesser degree upon location. Those who own whale-boats put them in order with the first open water and proceed to the whaling grounds where they fish for white whale. A successful whaling season means prosperity for all. The flesh of the white whale is used for both human and dog food. The oil is extracted from the blubber and is stored in barrels or sealskin bags for use as part of every meal in the winter. Natives who have no whale-boats live in tents in the summer and carry on their fishing and whaling from the shore.

For generations the Eskimos of Canada have wrested a living, mated, and reared a family in a country where only a hardy and intelligent race could survive. They are slowly assimilating a certain amount of civilization while still retaining their independence, pride, and ability to care for themselves. Most of them now appreciate the value of conserving the natural resources of the country in which they live and co-operate in that work to a marked degree. Even though they may not always quite understand the meaning and purpose of the law, the natural tendency of the Eskimos is to obey it. Their communal life has taught them that the wishes of the individual must be subordinate to the good of the majority and this has made them especially easy to deal with. For a number of years the Government of Canada has been paying special attention to its Arctic citizens, in order to keep them independent, self-reliant, and self-supporting, and with this object in view has put forth continuous and unrelenting efforts to preserve the natural resources of the country so that the Eskimos may continue to be the admirable race of people they now are.



## THE FUR INDUSTRY

The fur trade in the Northwest Territories had its beginning in the latter part of the seventeenth century when the Hudson's Bay Company received its charter from Charles II to trade into these northern regions. From then until 1939, when the value of fur production was exceeded by that of minerals, fur trading continued to be the most important industry in the Territories, and the trapping of fine furs is still and is likely to continue to be the chief occupation of most of the native population. Trading posts are scattered throughout the Territories and the history of the vast region is intimately associated with that of the fur trade.

The expeditions of Mackenzie and Hearne opened up new territory for the early traders and the fur trade expanded rapidly. A chain of posts was established by the North West Trading Company along the Mackenzie waterways at intervals of about 150 to 200 miles. This system was continued and expanded by the Hudson's Bay Company, following the amalgamation of the two companies in 1821. The forts or trading posts were situated in strategic places and later became the nuclei of some of the present settlements. The same conditions prevailed along the coasts of the Eastern Arctic, where the Revillon Freres Trading Company and the Hudson's Bay Company operated until the latter company absorbed the former in 1935-36. In the Eastern Arctic most of the independent trading companies have retired from the field, leaving the bulk of the fur trade in possession of the Hudson's Bay Company. In the Mackenzie District, however, a number of independent traders still operate, in addition to the Hudson's Bay Company.

### Annual Yield

In the year ended June 30, 1941, a total of 447,547 pelts, exclusive of red squirrel, and valued at \$2,301,054, was harvested in the Northwest Territories. This amount represented about eleven per cent of the total value of fur production in the Dominion in 1941. From the viewpoint of value, white fox pelts are far in the lead in the Northwest Territories. Chief among the other furs of economic importance are the red fox, in its three colour phases - red, cross and silver - beaver, lynx, mink, marten, and muskrat. Smaller numbers of ermine, otter, fisher, wolf, wolverine, bear and others are also obtained.

The increase in the value of fur taken annually in the Northwest Territories to more than \$2,000,000 is the result of an increase in the price of furs. The number of pelts taken in 1940-41 was actually less than in the preceding year. There are natural fluctuations in the numbers of the various species of wild life which influence the fur yield. These fluctuations are being carefully studied by the Dominion Government in co-operation with the Bureau of Animal Population at Oxford University, and much information is being obtained in an endeavour to ascertain their causes.

### Native Game Preserves

A number of Native Game Preserves has been established in the Northwest Territories to assist in maintaining the basic industry of the native population. Trapping within these preserves is confined to Indians and Eskimos and to half-breeds living the life of natives, with the exception of such white trappers as were already operating in the areas at the time they were set aside as preserves. A list of these preserves follows:



<u>Name</u>	<u>Date Established</u>	<u>Area in Square Miles</u>
Yellowknife	Sept. 22, 1923	70,000
Slave River	" " "	2,152
Peel River	" " "	3,300
Arctic Islands (land area)	July 19, 1926	571,605
Mackenzie Mountain	May 3, 1938	69,440
		<hr/> 716,497

#### Other Preserves

Other steps have also been taken by the Dominion Government to maintain the fur industry of the Territories. Trapping, for instance, is entirely forbidden in the Thelon and Twin Islands Game Sanctuaries and no one is allowed to enter the former without a special permit from the Minister of Mines and Resources. From time to time areas are delimited in which additional protection is provided for one or more species of game animals or fur-bearers, a recent case being the closing to beaver trapping until further notice of an area of approximately 14,000 square miles in the delta of the Mackenzie River, a measure which will ensure the propagation of beaver in the region. Similarly, in order to increase the muskrat population, the Government in 1938 initiated a conservation project in Wood Buffalo Park by which the water level in a number of watersheds is being stabilized through the construction of dams and earth fills. Approximately 25,000 acres have been brought under control and consideration is being given to similar conservation measures in other areas.

The Thelon Game Sanctuary situated in the eastern part of Mackenzie District and extending into Keewatin District is an unique wilderness wild life sanctuary. This preserve, 15,000 square miles in extent, contains the largest remaining herds of musk-ox on the mainland of North America. The sanctuary is also crossed by large herds of barren ground caribou each year.

Wood Buffalo Park, containing an area of 17,300 square miles, of which 3,625 square miles are in the Northwest Territories, was established mainly for the preservation of a herd of wood bison or buffalo. The park now forms a vast preserve for many other species of big game and fur-bearing animals. In the establishment of the park, the protection and increase, not only of buffalo but of other game species, was intended. Consequently, in keeping with a policy of strict conservation, travellers to the region must obtain permission from the Park Superintendent to enter the park. Indians, half-breeds, and whites who trapped in the region before the park was established are permitted to hunt and trap under licence. The buffalo, however, are rigidly protected.

#### Hunting and Trapping Privileges

Licences to hunt and trap in any part of the Northwest Territories, including the native game preserves, are not required by natives nor by half-breeds born in the Territories and living the life of natives. As they apply to others, the regulations concerning game in the Territories provide that hunting and trapping licences shall be issued only to British subjects and then only to those who held licences on May 3, 1938. The regulations also provide that licences may be granted to the children of British subjects who have reached the age of fourteen and whose parents have resided in the Northwest Territories for the past four years.



## REINDEER

The delivery in 1935 of a herd of semi-domesticated reindeer from northwestern Alaska to the Northwest Territories introduced an industry which is intended to broaden the basis of subsistence of the native population by augmenting the wild life resources on which they depend. Since the inception of the industry there has been a steady growth in the number of animals, and in 1942 the original 2,370 reindeer had increased to more than 9,000. About 5,600 of these animals form the main herd on the reserve along the Arctic Coast east of the Mackenzie Delta, and the remainder are in two herds under native management, near the Anderson and Horton Rivers, east of the reserve.

The reindeer industry was established in Canada following the study by a Royal Commission of the possibilities of developing reindeer and musk-ox herds. In its report of 1922, the Commission recommended that experimental herds of reindeer be placed in selected locations, and in 1926-28 the Dominion Government undertook a reconnaissance of the area lying along the Arctic Coast between the Yukon-Alaska Boundary and the Coppermine River and north of Great Bear Lake. The investigations were made by A. E. Porsild, an experienced botanist, assisted by his brother R. T. Porsild. Prior to the study of the Canadian range the investigators visited Alaska to observe the conditions under which reindeer were handled.

In 1929 arrangements were made for the delivery by an Alaskan reindeer company of 3,000 deer to a selected range in Canada near the mouth of the Mackenzie River, which was later established as a reindeer reserve. The reindeer for the overland drive were selected by A. E. Porsild and the herd consisted of 2,890 does, 307 bucks, and 250 steers, the latter being for food and draught purposes. The drive was in charge of Andrew Bahr, veteran Lapp reindeer herder, who was assisted by a number of other Lapps and several Eskimos. Many difficulties were encountered. Some of the animals returned to their home range. Blizzards, intense cold, wolves, straying, accidents, and other obstacles impeded progress. The losses to the herd were severe but were recouped to some extent by the fawn crop each year. The reindeer arrived in Canadian territory in 1933 but the crossing of the Mackenzie River to the reserve was delayed by difficult ice conditions and was not effected until the winter of 1934-35.

Meanwhile, preparations for the reception of the herd had been made. A corral was constructed at Kittigazuit on the Arctic Coast, and buildings were erected for the accommodation of the reindeer staff and supplies. The headquarters station for the supervision of the reindeer field work is situated about 40 miles inland on the right bank of the east channel of the Mackenzie River, at the foot of the Caribou Hills, latitude  $68^{\circ} 41' N.$ , longitude  $134^{\circ} 07' W.$  It is about 40 miles by air and 75 miles by water from Aklavik. Improvements have been carried out at the station since it was constructed and in 1938, radio equipment was installed to provide communication with the Northwest Territories Administration at Ottawa. Messages are relayed by the Signals Station of the Department of National Defence at Aklavik.

The corrals on the reserve which are used for the annual roundup of the main herd are now located on Richards Island, the principal summer range. Here the animals are counted and classified about the end of July. The fawns are marked, breeding stock is properly proportioned, and animals surplus to requirements are selected for slaughter later in the year. The meat from



this surplus stock is supplied largely to mission hospitals and residential schools of the Mackenzie Delta area, the remainder being used for the reindeer camp or relief, with a limited quantity for sale. The main herd is used principally for the training of herders and to provide the foundation stock of native herds.

The training of young natives in the reindeer work has proceeded steadily and the two herds under native management are entrusted to men who had served as apprentice herders. They received the deer under a lending arrangement subject to the return of a similar number of animals as the herds increase in size. The Department maintains supervision over all herds and plans are under way to start additional native herds from time to time. During the winter of 1942-43 a substantial sale of reindeer meat from the native herds was made to the residents of Aklavik. A herd of about 2,000 deer was driven from the vicinity of Anderson River to the Reindeer Station on the reserve, where 300 of the best meat stock were slaughtered. The amount realized from this sale accrued to the herders.

The handling of the reindeer at the annual roundups and other occasions and the presence of herders at all times tends to prevent the animals from becoming wild and difficult to control. A number of mature steers in the herds is trained to harness for transporting supplies and firewood, moving the herd camp, and similar work. The milking of reindeer in the Canadian herds is not practised to any extent, as it is necessary to rope the does. This practice is not convenient on the open range.

In the spring the reindeer migrate from the inland winter ranges to the summer feeding grounds in the coast area, and return to the winter ranges in the early winter. The winter feed is principally reindeer moss, but in the summer the diet includes a variety of vegetation - grasses, shrubs, sedges, etc. One of the reasons why the reindeer seek the coast in the summer is to escape from insect pests which are restricted to some extent by the winds from the Arctic Ocean.

Reindeer are providing a convenient and dependable source of food and clothing and form a valuable reserve against periods of shortage in other necessities. As the natives learn to depend more and more on the herds of reindeer for subsistence they will become independent of fluctuations in the supply of game and price of furs, and thus achieve a more stable economic life than is possible under ordinary conditions which govern their nomadic life along the Arctic Coast of Canada.



## GEOLOGY

The Northwest Territories is made up of portions of four of the six physiographic provinces into which Canada, on the basis of its topography and geology, naturally falls. The islands to the north form the Arctic Archipelago. On the west the Mackenzie Mountains are the northeastern portion of the Great Cordilleran region which makes up most of British Columbia and Yukon. The belt bordering the Mackenzie River is the northern prolongation of the interior plains of Central Canada. East of the belt and extending over to Hudson Bay is a broad zone which forms part of the Canadian Shield. The rocks which comprise it are of Precambrian age, but in places, particularly along the Arctic Coast on the border of the Shield, considerable areas of the Precambrian rocks are concealed by a capping of younger sediments.

### Canadian Shield

The Canadian Shield portion of the Territories is a region of comparatively low relief, rising gradually from the Arctic Ocean on the north and from Hudson Bay on the east to elevations of about 1,500 feet in its central part east of Great Bear and Great Slave Lakes. In detail the topography is hummocky, consisting of ridges and hills separated by depressions which are commonly occupied by lakes or muskegs. The many lakes are of all sizes and shapes with very irregular shorelines and many islands. Over wide areas the land only here and there rises as much as 100 feet above the level of the immediately adjacent lakes. In other places the local differences of relief amount to more than 1,000 feet. The lakes owe their origin to the work of the continental ice sheet which spread over the region during the Pleistocene.

The low relief of the region was produced by long continued erosion in late Precambrian time, which eventually levelled the mountain belts that had earlier been produced by folding. During the Palaeozoic and Mesozoic eras this region of low relief was many times flooded, at least partially, by seas which advanced over its surface and later retreated. The sediments which accumulated in these seas were largely swept away by later erosion when, during the Tertiary, the region stood above the sea.

The oldest record we have in the Northwest Territories of Archaean or early Precambrian rocks is the accumulation of sediments and volcanics. Sedimentary rocks predominate and consist largely of greywacke and slate and their altered derivatives. Volcanic rocks, which are not particularly abundant in Northwestern Canada, include the types commonly known as greenstones, consisting of altered basic lavas, and in places these are altered to schists. All these rocks have been extensively intruded by granite. Between Lake Athabaska and Great Slave Lake these early rocks have been described under the term Tazin series; in the Great Slave Lake-Coppermine River area they have been variously called the Yellowknife group and the Point Lake-Wilson Island group. The Yellowknife group, at its type locality, consists of about 30,000 feet of lavas overlain by an equal or greater thickness of sedimentary rocks. The older lavas are chiefly andesite and basalt and pass upwards without break into flows that are mainly dacite and rhyolite. These in turn, are overlain by the sedimentary member, the contact being marked in places by an erosional unconformity, elsewhere by interbanded lavas and sediments. The sedimentary rocks are chiefly greywacke and slate. Over wide areas they have been altered to nodular quartz-mica schist and hornfels containing knots of chiastolite,



cordierite, staurolite, and other metamorphic minerals.

During the Proterozoic or late Precambrian, there were at least two periods during which great thicknesses of sedimentary and volcanic rocks accumulated in each of several widely separated areas. Rocks of the older period (early Proterozoic) have been recognized on the north shore of Lake Athabaska, in the east arm of Great Slave Lake, near the Arctic Coast, and in several intervening areas. On the north shore of Lake Athabaska white and red quartzite of the Beaverlodge series overlies Archaean sediments of the Tazin series and granitic rocks, but is itself cut by granite, gabbro, and norite. Between Athabaska and Great Slave Lakes the Nonacho series of conglomerate, slate, greywacke, arkose, and quartzite occupies an area about 100 miles long and up to 25 miles wide. The area is completely enclosed by granitic rocks, in part older, in part younger, than the Nonacho sediments. Along the east arm of Great Slave Lake a synclinalorium about 150 miles long consists of conglomerate, arkose, sandstones, quartzite, shale, slate, colitic iron formation, dolomite, breccia, basalt, andesite, trachyte, rhyolite, porphyry, and tuff. Two or more series of strata may be represented in this group which is known as the Great Slave group. It rests unconformably on granite, and is itself intruded by syenite and diorite. Between Great Slave and Great Bear Lakes several areas underlain by quartzite, arkose, conglomerate, slate, argillite, greywacke, dolomite, and limestone, with minor flows and basic intrusives, generally resemble the lower part of the Great Slave group and have been assigned to the early Proterozoic under the name Snare group. Pre-Snare and post-Snare granitic rocks occur in the vicinity. Along the Arctic Coast, between Parry Peninsula and Bathurst Inlet, three formations of probable early Proterozoic age rest on Archaean granite. The oldest is the Epworth dolomite best developed about Port Epworth. The second formation is the Kanuyak consisting of calcareous tuff and tuff-conglomerate. It occurs on the islands of Bathurst Inlet. The upper formation is the Goulburn quartzite which has a thickness of more than 4,000 feet.

Late Proterozoic time was marked in various parts of the region by the accumulation of flows and clastic sediments. In the Arctic region these rocks are known as the Coppermine River series; in the Great Slave Lake region, they form the Et-Then series; in the Lake Athabaska-Dubawnt River region they are referred to as the Athabaska series. The rocks of the Coppermine River series occur along Coppermine River and farther east on Bathurst Inlet. They consist largely of basaltic flows interbanded with some sandstone and shale and cut by diabase sills. The Et-Then series occurs in the east arm of Great Slave Lake and consists of conglomerate, sandstone, and quartzite, resting unconformably on the members of the Great Slave group, the granite, and the Archaean sediments. The Athabaska series is found south of Lake Athabaska and along Dubawnt River where it consists largely of white, buff, and reddish sandstone, arkose and conglomerate.

Throughout the western part of the Shield portion of the Northwest Territories, rectilinear topographic features or "lineaments" are very apparent from the air. The lineaments are formed by reasonably straight shore-lines, water-courses, scarps, valleys, or ridges, and some of them can be traced for distances of several hundred miles. Many of them are known to mark major faults, all of which stand about vertical. The fault-movements along them were dominantly horizontal, causing lateral displacements



as great as five miles. Many of the faults are marked by quartz veins and stockworks up to 1,000 feet wide. Some of this faulting is later than the late Proterozoic diabase intrusives that are the youngest consolidated rocks in the Shield.

The last great event in the geological history of the region was the spread of a continental ice mass in Pleistocene times. This had its gathering ground west of Hudson Bay from which centre it advanced in all directions. Erratics and morainal material left by the ice are scattered over the entire region.

Continuous mining operations commenced in the Shield part of the Northwest Territories only ten years ago. Since that time minerals to a value of nearly \$19,000,000 have been produced of which slightly more than half has come from the gold mines around Yellowknife (which began production late in 1938), and the remainder chiefly from radium-silver mines at Great Bear Lake. Other products recovered include copper, lead, and tungsten. The more important known occurrences of minerals of possible economic interest are summarized below.

Gold occurrences are widespread in the region extending northwards for 200 miles from the east arm of Great Slave Lake. They are also known along and near the west coast of Hudson Bay - on Chesterfield Inlet, Wager Bay, Term Point, and Ferguson River. Radium and silver minerals are found at a number of places around Great Bear Lake and to the south along Camself and Marian Rivers. Copper minerals are common around Coronation Gulf and south to Great Bear Lake. A copper-nickel sulphide body containing platinum group metals occurs on Rankin Inlet on the west side of Hudson Bay. Cobalt and nickel are associated with the Great Bear Lake ores and are also found in the area adjacent to the east arm of Great Slave Lake. Low-grade iron ores are found on islands in Great Slave Lake. Lead minerals occur on the Arctic coast and in the Taltson River area. Lead-zinc-copper replacement bodies are found in the Yellowknife-Beaulieu region near Homer and Tumpline Lakes. Chromite has been reported from Melville Peninsula and from the Coppermine River area. Molybdenite is locally abundant in the Yellowknife district. Tungsten has been recovered from the gold ores on Outpost Islands, Great Slave Lake, as well as from one of the hundreds of scheelite deposits known in the Yellowknife-Beaulieu region. Tin is likewise found in both of these districts. Tantalum, beryllium, and lithium minerals occur in pegmatites in the Yellowknife-Beaulieu region. Fluorite is reported from Baker Lake and from Snare River. Semi-precious gems, including sapphire, dichroite, chiastolite, jade, and lazulite have been found along and near the western margin of the Shield.

#### Cordilleran Region

An area of some 30,000 square miles of the Northwest Territories, west of Mackenzie River and between the Peel on the north and the Liard on the south, forms part of the great Cordilleran region of Western Canada. The Mackenzie Mountains, forming this region and a part of Yukon Territory are made up of ranges trending in a northwest direction and ranging in elevation up to over 8,000 feet with a relief, where explored, of 3,000 to 4,500 feet. The drainage of the area is to the Mackenzie, the chief streams being Arctic Red River, the Carcajou, the Keele (formerly the Gravel), the Root, the North Nahanni, and the South Nahanni, the last of which empties



into the Liard. All of these streams have steep gradients. On the Keele River where the belt is widest the high mountains lie about 50 miles from the Mackenzie, and between them and the Mackenzie lowland is a zone of foot-hills about 3,000 feet in height. Farther south at the "Great Bend" of the Mackenzie near where the latter is joined by the North Nahanni, the mountain front is an abrupt unscalable escarpment the top of which is 2,000 to 3,000 feet above the valley plain.

The rocks of the range are chiefly sediments of Palaeozoic age ranging from Upper Cambrian to Carboniferous. The rocks of the eastern belt are heavily bedded limestones, dolomites, sandstones, and conglomerates. Nahanni Peak, one of the striking mountain features to be seen by the traveller descending the Mackenzie, is composed of Middle Devonian strata. Lying above the hard limestones are Upper Devonian shales which have a thickness of as much as 2,000 feet, and above these is a limestone zone 800 to 1,100 feet thick. This in turn is succeeded by other shale and limestone facies 1,300 to 1,500 feet thick, all of Upper Devonian age. On the North Nahanni, the Middle Devonian rocks form an anticline with steep dips on the east and more gently inclined beds on the west.

In Pleistocene times, the Mackenzie Mountains were occupied by the northern extension of the Cordilleran ice sheet which here had a thickness of about 3,000 feet. The higher peaks were not covered.

Not many mineral occurrences have been reported from the Cordilleran part of the Northwest Territories, in part, at least, due to the fact that only very limited exploration and prospecting has been carried on here. Iceland Spar has been recovered from deposits in the northern part of the mountains: low-grade iron ores are exposed along the Keele (Gravel) River; and placer gold has been found along the Peel, Nahanni, and Liard Rivers.

#### The Interior Plains

The Mackenzie lowland includes the belt between the Cordilleran region on the west and the Canadian Shield on the east. It begins on Slave River, embraces the basin at the west end of Great Slave Lake, and continues down to the Arctic Coast. On Slave River its elevation is about 700 feet and from there northward the surface slopes gradually to the Arctic. North of Nahanni River the lowland is divided into two parts by the long, narrow ridge of Franklin Mountains, a western portion varying in width from 20 to 80 miles through which the Mackenzie flows and an eastern portion occupying all but the eastern part of the drainage basin of Great Bear Lake. The highest summit is Mount Clark of the Franklin Range which has an elevation between 3,000 and 4,000 feet.

The Mount Clark formation consists of red quartzites and sandstones of probable lower Cambrian age. Above these lies the Middle Cambrian Mount Cap formation consisting of grey, green, and red sandstones and shales, and a third formation consisting of red and green shales with gypsum-bearing beds belongs either to the Middle or Upper Cambrian. Shale beds of possible Ordovician age are also exposed at the base of Mount Kindle east of Wrigley.

Rocks of Ordovician and Silurian age form the base of the Palaeozoic section along a considerable part of the eastern edge of the lowland belt

where the Palaeozoic sediments overlap the Precambrian rocks of the Canadian Shield. Limestone and gypsiferous dolomite occur along Slave River and on the west side of the north arm of Great Slave Lake, Silurian sediments form an escarpment which probably continues northward to Great Bear Lake. Silurian strata are also exposed in Lone Mountain near the mouth of North Nahanni River, in Bear Mountain near Norman, and in Mount St. Charles on Great Bear River.

The Silurian strata are succeeded unconformably by beds of Devonian age which form the surface rocks over the greater part of the Mackenzie Lowland region. On Great Slave Lake these strata have been divided into three formations, in ascending order; the Pine Point limestone, about 100 feet thick; the Presqu'ile dolomite with an estimated thickness of 200 feet; and the Slave Point limestone about 160 feet. Along the lower Mackenzie the following formations have been correlated with these respectively; the Hare Indian River shales, over 300 feet thick; The Ramparts limestone, 250 feet thick; and the Beavertail limestone, 350 feet thick. The Ramparts limestone is so named from its excellent exposures in The Ramparts section just above Fort Good Hope.

Sandstones and shales of Cretaceous age cover considerable areas in the Mackenzie Lowland region. They outcrop on Liard River near the southern border of the Territories, along the Mackenzie north of Dahadinni River in several disconnected stretches, and along the western shores of Great Bear Lake. The beds are largely of marine origin, but in places some of the lower strata carry coal seams. At the mouth of Bear River a basin of partly consolidated Tertiary sands and clay with lignite beds has a length of 30 to 40 miles and a width of from 20 to 30 miles. The beds are of lacustrine origin.

The mineral resources of the Interior Plains include salt, gypsum, the mineral fuels, lead, zinc, and iron. Petroleum valued at nearly half a million dollars has been produced from the Norman Wells since 1932 and oil seepages have been reported from numerous places elsewhere in the Mackenzie River valley. Lignitic coal occurs near Norman and on the east coast of Great Bear Lake. Salt and gypsum occur widespread throughout the Interior Plains; some deposits have been put to local use. Ferruginous beds outcrop in the Franklin Mountains. Lead and zinc minerals are found in Devonian Limestones near Pine Point on the south shore of Great Slave Lake.

Comparatively little is known of the geology of the Arctic Archipelago. Available information suggests that, like the mainland part of the Northwest Territories, a three-fold division into Shield, Plains, and Mountains is warranted. Thus, the southeastern islands are composed chiefly of crystalline rocks of Precambrian age. Proceeding northwesterly these become overlain by nearly flat Palaeozoic sandstones and limestones, with successively younger strata, including carboniferous coal seams, appearing at the surface, generally similar in age and structure to the rocks of the Interior Plains. In the extreme northwestern part of the Archipelago, observations at a few widely separated districts suggest the existence of a mountain range consisting largely of folded and intruded Mesozoic rocks extending southwesterly



for nearly a thousand miles from northern Ellesmere Island through the Sverdrup group.

Occurrences of graphite and mica near the southeast coast of Baffin Island have been known for more than 360 years; some mining has been done for both these minerals. Coal has long been mined for local use from a small basin of Tertiary rocks near Pond Inlet on Baffin Island. One hundred miles to the west platinum, nickel, and silver occurrences have been reported from Admiralty Inlet. Iron ores are found in rocks of Proterozoic age on Belcher and Nastapoka Islands in Hudson Bay; at the latter locality they contain appreciable amounts of manganese.

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## MINING

The production of minerals on a commercial basis in the Northwest Territories is a comparatively recent development. It is, however, a very significant development, for the future importance of this region in the Canadian economy will probably be determined by the measures of success arising from such efforts. At present the value of the annual output of minerals is not large when compared with the older mineral-producing areas of the Dominion. It has, however, already surpassed that of the fur trade, the only other important industry in the Territories, and up to the end of 1942 has shown a steady increase. Because of the constant change in the mining picture, a detailed account of activities would serve no purpose, but a brief description of the nature and extent of operations may be of interest to the reader. An exception is made in the case of the development of the deposits of radium-bearing ore at Great Bear Lake, for this is one of the most colourful achievements in the history of Canadian mining.

The occurrence of potentially valuable minerals in the Northwest Territories was first reported by Frobisher more than 350 years ago, but most of the present knowledge of the mineral possibilities of the region has been acquired since 1920. In that year yields of oil were obtained from two wells drilled about 48 miles north of Fort Norman, but as there was no market for the oil, the wells remained capped for several years. It was during drilling operations at these wells, that the aeroplane was first used in the Territories and it was the advent of this form of transportation that paved the way for much of the exploratory and development work that has followed.

Interest in the mineral possibilities of the Northwest Territories can be attributed mainly to the discovery of radium-bearing and silver ores at Echo Bay on the east side of Great Bear Lake in 1930. The spectacular nature of the discoveries; the very idea that a Canadian source of supply of radium - the rarest of all elements - had been disclosed; and the likelihood that a marked reduction in the price would eventually follow, inspired a world-wide interest in the finds.

This interest has continued with the result that more knowledge of these possibilities has been gained within the past fifteen years than in the previous century. To date this knowledge is confined largely to a relatively narrow strip of country which forms part of the western fringe of the Canadian Shield and which lies between Great Slave and Great Bear Lakes. Comparatively little is yet known, except in a general way, of the mineral possibilities of the country lying west, north, and east of this belt of activity.

When the late James Mackintosh Bell along with Dr. Charles Camsell, present Deputy Minister of Mines and Resources, made a survey of the country in the vicinity of Echo Bay in 1900 they observed that the rocks facing the shore of the lake were stained with cobalt bloom. Reference to this fact was made in their report. Thirty years later Gilbert LaBine read the report. To a man trained in the Cobalt area of Ontario, this indicated the probability of silver being present and he decided to explore the region. In May, 1930, he and his partner, Charles St. Paul made the great discovery of pitchblende at Echo Bay.

LaBine returned with samples to Ottawa where officers of the Bureau of Mines confirmed them as being high quality pitchblende, the radium-bearing ore. Plans were made at once for the commercial development of the deposits, but difficulties had first to be overcome and one of the greatest of these was the devising of a suitable process for the extraction of radium from the Great Bear Lake ore. Such a process was eventually worked out by metallurgists of the Bureau of Mines at Ottawa and is now used as a basis of radium extraction at the refinery at Port Hope, Ontario.

During 1933, Eldorado Gold Mines, Limited, had completed the erection of a milling plant on the property and of a refinery at Port Hope. By the end of that year the property was in steady production and within a short time Canada had become one of the two important producers of radium in the world. The net result was a decline in the price of this substance from \$70,000 a gram to \$25,000 a gram. As a means of overcoming its transportation problem, the company decided to operate its own transportation system; by air with an aeroplane carrying a payload of 4,400 pounds, and by water with a fleet of diesel engine power boats, barges and oil tankers. With these craft in service most ore shipments were made by water, shipments by air being made only when absolutely necessary.

The production of radium in Canada had become a well established industry by September, 1939, when the war commenced, but in June of the following year the company was forced to close down its mine. This action was taken owing to the disorganized world markets and not because of any unfavourable conditions at the mine. However, as a result of a steadily increasing demand for the company's products the mine was reopened in August, 1942, and is again operating at full capacity. The mine has been developed by an adit level and vertical shaft near the No. 2 vein to a depth of 822 feet, with crosscuts to No. 1 and No. 2 veins on several levels. The mill has a capacity of 100 tons in 24 hours and the monthly output of concentrates varies between 100 and 150 tons. These concentrates are shipped by boat to railhead at Waterways, Alberta, from which point they are transported to the company's refinery at Port Hope, Ontario, where radium and uranium salts are produced. The plant buildings and workmen's quarters at the mine are provided with steam heat, running water, and electric light. Skilled labour is brought in on a one-year basis, and a resident doctor is retained to look after the health of the staff.

The discoveries at Echo Bay marked the commencement of an active and continuous interest in mineral development in the Northwest Territories. The interest was intensified when gold was found in the Yellowknife River area in 1935. Three years later, in September, 1938, the first gold brick produced in the Northwest Territories was poured at the "Con" mine of Consolidated Mining and Smelting Company of Canada, Limited, situated west of Yellowknife Bay, on Great Slave Lake. In 1942, gold to the value of \$3,736,002 was produced in the Yellowknife area, the greater part of which came from this mine. Silver production in the Territories for the same period amounted to \$9,316. The total mineral production in the Northwest Territories up to the end of 1942 was \$19,341,079, made up as follows:-gold, \$10,959,469; silver, \$824,745; radium, uranium, copper, tungsten, gas and crude petroleum \$7,556,865.



Other properties which have since come into production and were operating at the close of 1942 are the Rycon Mines, Limited, adjoining the "Con" mine and also operated by Consolidated Mining and Smelting Company; Negus Mines, Limited, also adjoining the "Con" mine; and Thompson-Lundmark Gold Mines, Limited, at Thompson Lake. Several other properties were developed to production stage but were forced to suspend operations mainly as a result of wartime conditions. These included International Tungsten Mines, Limited, successor to Slave Lake Gold Mines Limited, on Outpost Island, Great Slave Lake; Ptarmigan Mines, Limited, near Prosperous Lake, and Ruth Mine in the Francois Lake area. Some high grade ore was also shipped by Giant Yellowknife Gold Mines, Limited, from a property on the west shore of Yellowknife Bay but operations were discontinued in June, 1940.

# The harnessing of the waterfalls at Prosperous Lake to provide hydro-electric energy for the mines in the Yellowknife region has resulted in a lowering of operating costs at the properties served and should prove to be an incentive to exploratory and development work. Until 1939, most of the mining enterprises in the Northwest Territories used power generated by Diesel engines, the fuel for which was obtained chiefly from oil wells near Fort Norman operated by Imperial Oil, Limited. In that year, a refinery with a capacity of 840 barrels per 24 hours was erected at Norman Wells. It was brought into operation in 1940, and its products include aviation gasoline of 80 and 87 octane, motor gasoline, and light and heavy Diesel oil.

An important development in 1942 was the exploratory drilling program undertaken in the Lower Mackenzie region. This program is being carried out to meet the expanding requirements of the region brought about by war conditions. More than 20 new holes were drilled and the production of crude oil in 1942 exceeded 82,000 barrels, compared with 23,776 barrels obtained in 1941.

The Northwest Territories is producing radium, uranium, silver, petroleum and gold in commercial quantities. Other minerals also known to occur in the Territories include lead, zinc, nickel, copper and coal, but owing to prevailing low prices, remoteness from centres of population, and other reasons, little serious attention has been given to their development. Preliminary work has been done on a promising nickel-cobalt property situated at Sachowia Lake, north of Et-Then Island, Great Slave Lake. A more complete description of mineral occurrences in the Northwest Territories will be found in the section on Geology on pages 23 to 29, inclusive.

Impetus to mining in the Territories has also been provided by the intensive search for strategic war minerals carried on as a sequence to the geological investigations and mapping work completed by field parties of the Geological Survey Division of the Bureau of Geology and Topography, Department of Mines and Resources, Ottawa. Government geologists have examined occurrences of scheelite, the tungsten-bearing mineral, in the Tibbitt Lake, Beaulieu River, Gilmour Lake and Gordon Lake areas. While the veins discovered are reported to be rather small for large scale development under present conditions, the regions nevertheless are worthy of further prospecting. Preliminary development work has been carried out on some of these discoveries and one small shipment of tungsten concentrates was made from a property in the vicinity of Consolation Lake, near Beaulieu River.

# For details see section on Water-power Resources.

## SYNOPSIS OF QUARTZ MINING REGULATIONS

Regulations for the disposal of quartz mining claims on Dominion lands in the Northwest Territories, effective April 2, 1932.

Miner's licences required - The fee for a miner's licence for an individual is \$5; for companies, according to amount of capital. Licences are obtainable from the Mining Recorders at Fort Smith and Yellowknife, Northwest Territories, all Sub-mining Recorders in the Territories and at Edmonton, or from the Lands, Parks and Forests Branch, Department of Mines and Resources, Ottawa.

Number of claims which may be staked by licensee - Six in own name and six claims each for not more than two other licensees, or eighteen claims in all, in any one licence year, in any one mining division.

Size of claims - Not to exceed 1,500 feet in length by 1,500 feet in breadth, with boundary lines running as nearly as possible north, south, east, and west. Claims to be marked on the ground with four legal posts, number one post to be placed on northwest corner. Lines to be blazed between each post.

Recording - Application for the granting of a claim must be made to the Mining Recorder for the district within fifteen days of staking if claim is located within ten miles of the office of the said recorder. An extra day is allowed for each additional ten miles or fraction thereof. Recording fee, \$5; if recorded on behalf of another licensee, \$10 per claim.

Grouping - Adjoining claims not exceeding thirty-six in number may be grouped for the purpose of representation. Fee for grouping certificate, \$5.

Representation work - Claims may be held for a period of one year and thence from year to year, without the necessity of re-recording, provided that development work to the value of \$100 is performed on the claim each year. Aerial reconnaissance and geological survey costs may be accepted as representation work up to the termination of the third year after the date of recording.

### Other Mining Regulations

In addition to the foregoing, there are regulations governing the disposal of the following mining rights on Dominion lands:-

Placer mining	Alkali
Coal	Potash
Dredging	Quarrying
Oil and Gas	Sand, Stone, and Gravel in the Beds of Rivers
Carbon Black	

Copies of all mining regulations may be obtained from the Mining Recorders at Fort Smith and Yellowknife, or from the Bureau of Northwest Territories and Yukon Affairs, Lands, Parks and Forests Branch, Department of Mines and Resources, Ottawa, Canada.



## WATER POWER RESOURCES

In recent years aerial photographic surveys and mapping and geological explorations designed to stimulate mineral development have greatly increased the amount and reliability of the information concerning the topography of the Northwest Territories. Many important rivers and lakes have been mapped and reasonably accurate records of the available heads have been secured. A beginning has been made also on the more accurate power surveys necessary before development of a water-power site can take place.

A power survey of the Yellowknife River was made in 1937 and a tentative scheme of development was worked out. Consolidated Mining and Smelting Company applied for the right to develop a site between Bluefish and Prosperous Lakes about 20 miles north of Yellowknife settlement. The initial stage of this development was completed in 1940 and is the first water-power project to be brought into operation in the Northwest Territories.

The development consists of a dam at the outlet of Bluefish Lake to raise the water 15 feet, a power-house near Prosperous Lake to which the water is diverted from the upper lake about one-half mile across the divide by means of an open-cut rock tunnel and a woodstave penstock. The power equipment consists of a turbine rated at 4,700 horse-power and generator of 4,200 kilovolt-ampere capacity. If more power is required, the extent of the development can be almost doubled by raising the level of Bluefish Lake an additional 10 feet and by building a dam at the outlet of Duncan Lake about 25 miles upstream to raise the water of that lake about 10 feet. Delivery of power from this source was commenced on January 15, 1941, over the 33,000-volt transmission line to the Con, Rycon, and Negus mines. The line also serves the Ptarmigan mine. Power from the project is available for distribution in Yellowknife settlement, and a separate transmission line, 27 miles in length, supplies power to the Thompson-Lundmark property east of Yellowknife River.

Elsewhere in the Northwest Territories, large areas have been surveyed by aerial methods in recent years so that the fall of the principal rivers and their drainage areas are closely established. Thus, it is now possible to make a reasonably close estimate of the water-power resources of the Territories as a whole. Tentative estimates indicate a total of about 280,000 horse-power available under conditions of ordinary minimum flow with almost 690,000 horse-power ordinarily available for six months of the year. Of this, as stated, only 4,700 horse-power has been developed.

This water power is chiefly in the Mackenzie District, and little is known of the water-power resources of the Arctic Islands, Franklin District, but these are believed to be unimportant. From present knowledge, one of the most attractive rivers in the Northwest Territories, from a purely water-power standpoint, is the Lockhart, which enters the east end of Great Slave Lake. This river has a descent of 700 feet in a distance of 25 miles. Artillery Lake and the other lakes offer excellent opportunities for storage to equalize the flow of the river in its lower course.

The Taltson-Tazin River system, which enters Great Slave Lake from the south has many rapids and falls, the Twin Gorge fall on the Taltson being particularly notable, with a reported total descent of 130 feet. Much of the water of Tazin River is diverted south into Lake Athabaska to supplement the flow being developed at Wellington Lake, near Goldfields, Saskatchewan. Snowdrift River, also south of Great Slave Lake, is reported to offer considerable power possibilities. Such records as have been secured of Hay River indicate that although its flow is not great, two effective power concentrations are possible.

Great Bear River, where it cuts through the Franklin Mountains, has rapids which afford a power head of possibly 25 feet, with the vast area of Great Bear Lake available to equalize the flow. Tributary to Great Bear Lake is Camsell River, upon which surveys have been made with a view to the development of power for mining purposes. At White Eagle Falls a head of approximately 70 feet could be secured which would render more than 4,000 horse-power available at ordinary minimum flow and more than 10,000 horse-power available for six months of the year. Camsell River issues from a series of lakes and it is stated that it would be feasible to secure complete regulation of the flow of the river, in which case considerably more continuous power could be secured.

At Virginia Falls on the South Nahanni River there is a descent of over 300 feet having a power capacity estimated at 5,000 to 12,500 horse-power. Other possible power-sites in this district are believed to exist on Liard and Peel Rivers. Some of the rivers flowing into the Arctic Ocean, including Coppermine and Back Rivers, appear to have considerable power possibilities. This also applies to some of the rivers flowing into Hudson Bay. At two concentrations it is estimated that from 220,000 to 506,000 horse-power could be developed on Slave River, near Fort Smith. Most of this power is in Alberta, but it would be readily available for use in the Northwest Territories.



## AGRICULTURE

In the administration of the Northwest Territories, in so far as it relates to the development of the natural resources of this large section of Canada, account must be taken not only of the immediate potentialities of these resources, but of their possible future importance. Farming, for instance, is of little present importance, except for local requirements. In other parts of Canada, however, notably in northern Ontario, mining has provided a steadily increasing outlet for farm products, and mining activities are becoming of increasing importance in sections of the Northwest Territories. Whether or not these activities will eventually pave the way for farming on a much larger scale than at present, it is difficult to say, but in any event any development tending to promote settlement will in turn encourage an interest in the agricultural possibilities. So far, however, farming in the Northwest Territories has been confined almost entirely to the efforts of scattered missions and a few individuals, chiefly in the valley of the Mackenzie River. Some of these efforts have been highly successful, even though they are small-scale in nature, and they provide, in many instances, valuable information as to future possibilities.

An official of the Dominion Department of Agriculture, describing what he had seen in the way of farming during the course of an investigation in the Territories, makes mention of horses thriving on the range along the Sixtieth parallel; of crab-apples ripening beside Great Slave Lake; of potato vines at Fort Simpson, 900 miles north of the International Boundary; of winter eggs secured from domestic fowl at Fort Providence and Fort Simpson; of vegetables and green feed grown on the edge of the Thelon Game Sanctuary; of potatoes and cabbages regularly planted at points down the Mackenzie almost to its mouth; and of cereals sufficiently mature to reproduce raised on the Mackenzie Delta. These are indeed significant achievements in view of the frost hazards, the brevity of the open season, the inclement winters, the well-water problem, the transportation handicap, and other unfavourable conditions.

The following brief notes are based on the aforementioned official's report on his investigation and on subsequent development.

Fort Smith - The site of Fort Smith is jack-pine sand, but heavy manuring induces luxuriant growth in most instances. Root crops, including potatoes, turnips, and carrots are being successfully grown in the vicinity of this centre. Garnet wheat has been found to ripen well at the Oblate Mission near Fort Smith.

Great Slave Lake - Spring is tardy on the south shore, but on the peninsula site occupied by the settlement of Fort Resolution, killing autumn frosts usually do not occur until September. Excellent alfalfa and sweet clover plots have been raised at the Indian Agency and the Mission. Celery, tomatoes and potatoes are also grown.

On the west shore of Yellowknife Bay the efforts of one resident to grow garden products on a few acres of well cared for and fertilized land between rock ridges were very successful. The vegetables raised were well developed and sold at a good price in Yellowknife settlement.

Hay River - The soil at the trading post in the delta of Hay River is 18 inches of black silt loam overlying sand. The climate is windy and dry. The Anglican Mission's crop includes potatoes, celery, green tomatoes, and occasionally fodder corn.

Fort Providence - Gardening was commenced in 1867 and is still practised. Ripe tomatoes and celery are no novelties and melons and potatoes are also grown.

Fort Simpson - Cropping and the raising of livestock has long been carried on. When there is warm, showery weather during the long midsummer days of this latitude ( $61^{\circ} 52' N.$ ), growth is phenomenal. There is an experimental substation at the settlement operated by a resident under the auspices of the Federal Department of Agriculture.

The Lower Mackenzie - Vegetables are grown successfully at the mouth of North Nahanni River and at other points, particularly at Fort Norman and Fort Good Hope, and Thunder River, where fine crops of potatoes, turnips, carrots, and cabbages have been raised for many years. An interesting experiment is being made by the Medical Officer of the Department of Mines and Resources at Aklavik who is endeavouring to breed a hardy stock of cattle which will thrive under Arctic conditions with a view to establishing a small dairy farm. He is clearing some 50 acres of land on which to raise fodder and if the project is successful it will be of great benefit to the residents of the settlement.

Several other instances could be cited of the success attained in the farming efforts in the valley of the Mackenzie, but it should be noted that this success is due largely to the diligent work of those concerned.

Cropping in the Mackenzie District will be confined essentially to the sedimentary lowland. Most of the soils of agricultural value are believed to have been the product of alluvial deposit and water assortment; and of the land from Simpson northward, the creek valleys are considered to be the most suitable for the raising of farm produce. There is much muskeg, but this is often capable of successful cultivation. Back from the streams much of the Mackenzie valley has been repeatedly fireswept. Summer fires destroy humus so that large areas may be expected to represent a rather inferior class of woodland and brule soil. Aridity may be a major reason for the tendency of wild barley to grow in abandoned clearings.

Moss peat is an important component of many northern soils and when decomposed and mixed with mineral particle it appears to have a beneficial effect as a soil ameliorant. After the fibre-destroying process of cultivation has proceeded too far some of the northern soils become "sad", as noted on some of the older ground at Fort Simpson, Fort Providence, and Fort Good Hope.

Experienced frontiersmen agree that before any part of the North is opened to agriculture on a large scale, conditions should be carefully studied and the most likely areas selected. If, then, settlement commences along the water front, working gradually back and utilizing the safer conditions for the less hardy crops, frost will be fought with the best chances of success. Without dispossessing bison, reindeer, or musk-ox, it may be feasible to introduce poultry and domestic animals, to grow field crops to some extent, and profitable gardens almost to the Arctic Ocean.



## F A U N A

### Land Mammals

The total number of mammal species in the Northwest Territories is not very great, but those which occur are often present in great numbers. Six species are white for part or all of the year. These are the polar bear, Arctic fox, Arctic wolf, weasel, Arctic hare, and the collared lemming. A striking feature of animal life in the north is periodicity in numbers. The list of species whose numbers fluctuate from extreme scarcity to great abundance at regular intervals includes all the smaller mammals, and with them the Arctic fox, the most important fur-bearing animal in Arctic Canada.

One of the most interesting mammals is, undoubtedly, the musk-ox Ovibos moschatus (Zimmermann). In fairly recent times it was found all over the Barren Grounds west of Hudson Bay and on all the Arctic Islands except those of Hudson Bay, Baffin and Bylot Islands, and the Rignes group. There are now only scattered herds of musk-oxen on the mainland, the largest being in the Thelon Game Sanctuary. There are also herds on certain Arctic Islands, particularly Melville and Ellesmere Islands. The killing of musk-oxen is forbidden.

The most important land mammal from the point of view of the natives is the Barren Ground caribou, Rangifer arcticus arcticus (Richardson). It provides them with food and its skin excels all other materials for making clothing and sleeping robes. The largest herds of caribou are found on the mainland where groups often numbering many thousands are encountered in migrations from one seasonal range to another. The habitat of the Stone Caribou, Rangifer arcticus stonei Allen, is the western side of the lower Mackenzie River. Western Woodland Caribou, Rangifer caribou sylvestris (Richardson) are found in small numbers in the wooded districts from northern Manitoba to Anderson River, overlapping slightly the winter range of the Barren Ground caribou.

Moose, Alces americana (Clinton) are fairly plentiful in certain sections and range north to the limit of trees. The animal is of importance to the Indians for food and clothing.

Mule deer, Odocoileus hemionus (Rafinesque) are found in the southern portion of the Mackenzie District.

Wood bison, Bison bison athabasca Rhoads, are restricted to the Wood Buffalo Park lying north and south of the 60th parallel. Plains buffalo were shipped to this area from Buffalo National Park some years ago.

White Mountain sheep, Ovis dalli dalli Nelson, are found west of Mackenzie River.

Black bear, Ursus americanus americanus Pallas, are fairly common in the southern part of the wooded region. Other rare species of bear have been taken in the northern portion of the Territories. The Polar bear, Ursus Maritimus (Phipps), is found about the coasts of the circumpolar regions, and sometimes wanders far out on the ice. It is so much at home in the water that if it were classified according to habits it would be discussed under the Sea Mammals, along with the seals on which it feeds. Its numbers vary greatly in different parts of the Canadian Arctic, and in some localities it is common enough to be of real importance to the Eskimos as a source of food and clothing.

Northern timber wolf, Canis lupus occidentalis Richardson, is generally found in the wooded districts.

Arctic wolf, Canis lupus tundrarum Millar, is common in the northern area.

The fur industry of the Arctic depends on the Arctic fox, Alopex lagopus (L). Under this name are included both white and blue fox, which are merely colour phases of the same species. In Arctic Canada, the blue fox is comparatively rare. As has already been mentioned, the number of Arctic fox, and consequently the catch, varies over a period of about four years. Investigation has revealed that the actual cause of the cycle in fox is a similar cycle in the lemming on which the fox feeds. The lemming is a rodent looking like a large, chunky field mouse. There are two species in the Canadian Arctic, the Back lemming, Lemmus trimucronatus trimucronatus (Richardson) and the collared lemming, Dicrostonyx groenlandicus (Traill). These creatures can increase in two seasons from scarcity to incredible numbers.

Other fur-bearing mammals are the beaver, muskrat, mink, marten, lynx, fisher, wolverine, weasel, skunk and various coloured foxes. Hares of various species are important as food for natives and certain animals. There are also other mammals which are not of sufficient importance to mention specifically.

#### Sea Mammals

All of the sea mammals play an important part in the economy of the inhabitants of the Arctic regions. They are essential parts of the food source of the Eskimos and from some of them are obtained material for clothing and other articles. Some are also of commercial value to the white traders. The seals, of which there are several varieties, are perhaps of the greatest economic importance to the Eskimos. From them are obtained food, clothing, dog food, and material for implements. The following descriptive notes deal only with the more important species of marine mammals.

The Ringed Seal, also called the Rough Seal or Jar, is the common seal of the coasts of both Western and Eastern Arctic regions. It is the chief source of food of some of the Eskimos. The haired skin is used for making waterproof boots, and the dehaired skin for other garments, especially when caribou are scarce. The skins are also purchased by the traders, but do not bring a large price. The young are born in an opening in the snow beside the breathing hole in the ice, and are covered with a white woolly fur.

The Bearded Seal, Big Seal, Ground Seal or Square-flipper, is a circumpolar species which is fairly common in the Eastern Arctic, and also occurs in the Western Arctic, but is not common west of Darnley Bay. It is most plentiful in the vicinity of Dolphin and Union Strait, south of Victoria Island. Owing to its large size (up to 800 pounds) it is much prized by the Eskimo, as it provides a great amount of meat and blubber. Its heavy hide is used for boot soles and for covering the large skin boats, and is cut into heavy line which is used for dog traces, harpoon lines, and lashings of any kind. It lives mostly on crustaceans and mollusks.

The Atlantic Walrus have become scarce and are now rarely found in the Atlantic south of Hudson Strait, although at one time they ranged much farther south. In Hudson Bay they are found as far south as the Belcher Islands



Apparently the western limit of range of the Atlantic Walrus is at Fury and Hecla Strait in the south, and in the west, the upper part of Prince Regent Inlet as far south as Bellot Strait, and in the middle of Barrow Strait south of Cornwallis Island.

The Pacific Walrus seldom go east of Point Barrow, although they were formerly plentiful as far as Cape Bathurst.

An Order in Council prohibits the killing of walrus except for food and only Eskimos may kill them without a licence. The export of walrus tusks or ivory, except in the shape of manufactured articles, is legal only by permit from the Minister of Fisheries.

Bowhead or Greenland Whales were at one time very plentiful in Baffin Bay and in Hudson Bay and Hudson Strait. Great numbers were killed during the whaling season, and they soon became so scarce that it was unprofitable to hunt them, especially after the drop in the price of whale-bone and the introduction of mineral oils, which replaced whale oil as a lubricant. Before the introduction of firearms, the natives of some localities captured the Bowhead by lancing it from their skin boats, and used the flesh for food, and the oil for food and fuel. The bones were used for making implements.

White Whales are found in Arctic and sub-Arctic seas as far north as latitude 74 degrees and some are occasionally found as far south as Cape Cod, Massachusetts. They are much prized by the Eskimo, especially in places where they enter bays and estuaries in large schools.

Narwhal are found usually in the more northern waters, preferring the proximity of the ice, so that, in summer, their range is more northerly than the white whale. They are especially abundant at Pond Inlet, and in the icy waters of Foxe Channel and Frozen Strait, and were at one time abundant in Cumberland Sound and along Hudson Strait. Their long, spirally twisted horn, which is an overgrown incisor, often attains a length of 8 feet and a weight of 14 pounds.

### Birds

Although some systematic work has been done by Canadian Government expeditions, and although early explorers and others have brought back much information of value to ornithologists, relatively little is known as yet of the bird life of the Arctic regions. With the establishment of many new settlements, however, there is greater opportunity than heretofore to make systematic studies of this form of life.

The birds of the Western Arctic and sub-Arctic region of Canada are somewhat different from those of the Eastern Arctic, owing to the existence of wooded areas in the former region. In the lower part of the Mackenzie River basin, bird fauna are essentially Eastern as far as the Arctic Coast at 138 degrees west longitude. As the valley is sheltered, it carries the range of many species far north of their limits farther east. The robin, yellow warbler, and water thrush are found as far north as the lower islands of the Mackenzie Delta, while western influences may be seen in the delta in species like the varied thrush and Say's phoebe. Other typical birds of the wooded area include the white-crowned sparrow, Canada jay, and spruce grouse. The unwooded area has such Arctic species as the willow and rock ptarmigan, snow bunting, and lapland longspur. On the border between woods and tundra the tree sparrow and Harris' sparrow find their nesting ground.

Geese and fresh-water ducks breed in the marshes and lakes, particularly in the Mackenzie Valley and are of some importance as food for the residents. They also contribute migratory fowl for the south. The game ducks breed mostly in the delta and in the overflow flats along the Athabaska-Slave-Mackenzie River system. The lakes of the Precambrian area are as a rule deep and clear and as they provide little feed for ducks, few breed there to augment the southern flights for autumn. The only common duck in the tundra region is the old squaw, which breeds in the interior north of the timber-line. Many Canada geese and lesser snow geese breed east of the Mackenzie Delta, on Banks Island, and farther east. The white-fronted goose is of general distribution, but is not common anywhere along the coast. Whistling swans are fairly common east of the Mackenzie, especially in the region near Langton Bay. Black brant breed near the coast east of the Mackenzie in the vicinity of Cape Bathurst, east of which they are rare. They are not found from Coronation Gulf to the Eastern Arctic. Blue geese nest only in the Canadian Arctic and their principal nesting ground, which was discovered in 1929, is on the west coast of Baffin Island. Two other nesting areas have been discovered, one on Southampton Island and the other on Perry River. Likewise, the northwest Arctic Islands and Perry River are respectively the only nesting places of the greater snow goose and Ross's goose.

Compared with those of the Eastern Arctic, the coasts of the Western Arctic are generally low and flat, and they provide a more favourable area for shore-birds and tundra plain species. The absence of puffins, auks, and auklets in the Western Arctic, and in fact, east of Point Barrow is due mainly to the physical character of the coasts. These birds are abundant in western Alaska as far as Cape Lisburne where the rocky cliffs preferred by the birds as nesting places terminate and the coastal plains appear.

Most of the migrants on the main Arctic Coast move from east to west instead of north and south. The sea-ducks, gulls, jaegers, and many of the shore birds come from Bering Sea and the Pacific. Some of them come around the far northwest corner of Alaska, reaching the eastern limit of their range as far east as Banks Island, Melville Island, and Coronation Gulf. East of Franklin Bay, the country for the most part is barren or rocky, and the shores of Amundsen Gulf, Dolphin and Union Strait, and a large part of Coronation Gulf show a surprising scarcity of birds. The migrations follow regular narrow and uniform routes from year to year. In the early spring, they follow leads of open water along the edge of the floe-ice, but later they follow the coast from one headland to another straight across the ice of the bays. At Cape Bathurst and at Baillie Island post on the peninsula between Liverpool and Franklin Bays, there may be seen during some seasons an almost continuous migration of eiders, starting before the season of open water and lasting until the autumn freeze-up.

The willow ptarmigan and the smaller rock ptarmigan are the most important birds in the economy of the northland. They are widely distributed reaching the most northerly islands, and are prolific breeders. They form an important part of the food of the fur-bearing carnivores, and provide the only feathered game available for human food in an emergency. Except for minor fluctuations, the ptarmigan will probably maintain their numbers for many years as vast areas are still unhunted.



## Fish

Fish of several varieties are abundant in many parts of the Northwest Territories and are of economic importance. For the most part, however, it has not been considered commercially feasible to export them owing to the distances from the fish consuming centres. Because of peculiar water conditions and of a deficiency of fish food, the main portion of Hudson Bay is not productive of fish and it is questionable whether, over a period of several years, its coastal rivers and shore fisheries can do much more than support the needs of the local population.

The scarcity of fish in Hudson Bay was noticed as far back as 1771, when the Hudson's Bay Company investigated the bay's resources. In 1931 the Canadian Department of Fisheries made a study of the deep sea fisheries of the bay, using steam trawlers and drag nets, but after three weeks of effort during which more than 200 miles of sea bottom were covered, no commercial fish were taken. During the same season the Department investigated the coastal fisheries north of Churchill. Competent fishermen, using nets, covered the area, but obtained only about 6,000 pounds of fish during the summer and autumn seasons, the chief varieties taken being Arctic char and ciscoes.

Following are descriptive notes on the chief varieties of fish found in the Northwest Territories and in waters bordering the Territories.

Arctic Char, also called sea trout or salmon, are perhaps the most important food fish of the Arctic. They occur in great numbers in certain seasons of the year and are found in both fresh and salt water, chiefly near the mouths of rivers in the latter case. They are plentiful in portions of the Eastern Arctic and Baffin Island, in the rivers of Melville Peninsula, and in the Frobisher Bay region. They also frequent the northern parts of Hudson Bay and the coastal waters of the northwestern mainland of the Northwest Territories.

Whitefish of one or more species are found in almost every lake or stream of the mainland. Many of the early explorers depended on them to a large extent for food and they still play an important part in the food economy of sparsely settled regions. They make an excellent dog food for winter travel.

Round Fish, Frost Fish are a species of whitefish of which little is known of their abundance or distribution in the Territories.

Arctic Cod are widely distributed in Hudson Bay and among some of the islands of the District of Franklin.

Ordinary or Newfoundland Cod have been taken at Port Burwell at the entrance to Hudson Strait. Cod weighing up to 40 pounds are taken in the tidal lagoons in Frobisher Bay.

Tom Cod are found in Western Arctic waters as far east as Coronation Gulf and are abundant in some localities. They are taken through the ice with hooks and are also caught by the Copper Eskimos with a large barbless hook holding small bone bangles. Other members of the cod family are occasionally caught in the Eastern Arctic.

Halibut or Greenland Halibut are found in the Eastern Arctic, especially on the Greenland side.

Flounder, a Pacific species is found east of Coronation Gulf.

Inconnu or Conny inhabit most of the large rivers of the Northwest Territories west of Anderson River, ascending them as far as the first rapids. They are of low vitality and are sluggish, which probably explains why they are not found above any heavy rapids in the streams they frequent. They average from 8 to 20 pounds. In the Mackenzie River system, the inconnu probably winter at the Mackenzie Delta and in Great Slave Lake. They ascend the rivers about June and return in October. They spawn at Fort Smith from about mid-September to October and are found in great numbers in the eddies below the rapids. At the mouth of the Mackenzie River they are caught by the Eskimos through the ice by means of hook and line baited with an ivory lure. The larger Connies are not palatable but the smaller ones, when dried and smoked, are suitable for human consumption. Connies make excellent dog food.

Grayling, or Bluefish as they are called in the Mackenzie region, are widely distributed but are found only in clear lakes and rivers. They are of little value as food or game fish.

Capelin are rather common as circumpolar fish.

Suckers are found in most of the waters of the Mackenzie Delta and in the rivers of the Mackenzie Valley. They are used for dog food when other fish are not obtainable.

Cisco, Tullibee, Lake Herring are found in the brackish portions of Hudson and James Bays and also along the Arctic Coast and in Arctic Red River, where they are abundant in the spawning season in September. Several species occur in the mainland portions of the Northwest Territories.

Great Bear Lake Herring are a common food fish in the Western Arctic along the coast as far as east of Coronation Gulf. They are caught in nets during the summer and by hooks during the ice season.

California Herring are abundant in the waters about Cape Bathurst in late August, where they are taken in nets in large numbers.

Lake Trout are a very excellent food fish and are found in most of the large inland lakes in Mackenzie and Franklin Districts, especially in deep waters. They occasionally reach a weight of 60 pounds.

Pike or Jackfish are found along the north mainland coast from Alaska to Cape Bathurst in the rivers and inland lakes and are especially abundant in the region of the Mackenzie Delta. They weigh as much as 35 pounds but average from 5 to 15 pounds. They frequent clear pools at the foot of falls and rapids and the deeper lakes.

Smelt are common about the Arctic Red River and are an important food in that locality.

Burbot, Ling, Loche are found in most of the fresh and brackish waters of the Mackenzie and Keewatin Districts but are not abundant. They occur also along the coasts of James Bay.

Other fish of lesser importance found in the waters of the Northwest Territories include goldeye, several members of the sculpin family, several varieties of rays, dog fish in Davis Strait, sticklebacks, and the Greenland or sleeping sharks.



## F L O R A

### Forests

There is no forest industry in the usual sense of that term in the Northwest Territories, nor is there any prospect of such an industry developing on a considerable scale. What forests there are, however, should be sufficient to meet the needs of the residents in perpetuity, provided that reasonable protection from forest fires is afforded. The principal tree species are aspen and balsam poplar, white and black spruce, white birch, tamarack, and jack pine. The eastern part of the Territories is practically devoid of forests, but in the Mackenzie District there are several areas of forested land, varying in nature from scattered clumps of stunted conifers and birches near the northern limits of tree growth to fairly heavy stands of poplar and spruce in the vicinity of the larger rivers. These forests are of value chiefly as a source of building materials and fuel for use by the local population, and as a favourable environment for fur-bearing and game animals.

Owing to the high cost of transportation, most of the lumber used in the Northwest Territories is of local manufacture. Small sawmills, usually equipped with planing machines, are operated at various points on Slave River, Great Slave Lake, and Mackenzie River. Most of the lumber sawn is white spruce, and the wood of this species is used for all parts of buildings. It is also in demand for boat-building and for almost every other purpose for which lumber is used.

The limited supplies of tamarack, because of the toughness and durability of this species, are well adapted for use in certain parts of boats and make excellent ground sills for buildings. White birch is used by the natives for snowshoe frames and for framing canoes, although its bark has been largely superseded by canvas for canoe covering. Black spruce is occasionally sawn in small quantities, and this species and jack pine are used in the construction of log cabins. The poplars are used chiefly for fuel, and fuel-wood is the most important forest product in the Northwest Territories. The quantity of standing timber available for fuel is augmented by the large amount of driftwood which annually finds its way into Mackenzie River.

The notable development of the mining industry during recent years has created new demands for building material and fuel-wood in the vicinity of the mines. Unfortunately, the increase in prospecting has greatly increased the danger to the forests from fire.

All forested lands within the Territories are included in four subdivisions or sections of the Boreal Forest Region. Two of these, the Mixedwood and Northern Coniferous Sections, are represented by relatively small areas adjacent to the boundaries of Alberta and western Saskatchewan, the other being included in the Mackenzie Lowlands and Northern Transition Sections.

The Mixedwood Section occupies a small area along the Alberta boundary south of the west end of Great Slave Lake and Mackenzie River. It is believed to afford the best growing conditions for forest trees in the Territories. Soils are of glacial origin and of considerable depth, and are usually well drained. Aspen and white spruce are the typical trees and these are accompanied by all the other species found in the region.

The Northern Coniferous Section occupies a small triangle with its base on the northern Alberta boundary and lying immediately east of Fort Smith. Here soils are shallow and drainage is poor. Black spruce is the principal tree species and it is sometimes found in mixture with jack pine, and with tamarack in the lower and wetter areas.

The Mackenzie Lowlands Section is the most important forest area of the Territories. As its name implies, it occupies the low-lying plains in the Basin of the Mackenzie River and embraces the lower portions of the Liard, Peel, and Great Bear Rivers. The soil is of glacial, alluvial, and lacustrine origin and is generally of good depth. Although the sub-soil is never free from frost, trees grow to a fairly good size. White spruce, the poplars, and birch are all well represented; black spruce and tamarack occupy the swamps, and jack pine the sandy areas.

The Northern Transition Section lies north and east of a line passing through the mouth of the Mackenzie River to Great Bear and Great Slave Lakes. Unfavourable climatic conditions, together with thin soils and poor drainage restrict the stunted tree growth to the most favourable areas in valleys and along the banks of streams.

Satisfactory estimates of the areas and volumes of the various types in the Territories are lacking, but more definite information becomes available as the area covered by aerial photographs is extended. It is already known that the forests are not of sufficient present value to justify large expenditures in mapping and describing them, but air photographs taken from time to time for other purposes will give the information needed for their administration.

As the fur trade has been and will continue to be the main support of the Indian population, and as forest-dwelling animals supply the Indian with meat, it is felt that one of the greatest values of the forests of the Northwest Territories lies in the habitat which they provide for game and fur-bearing animals.



## LANDS, TIMBER, GRAZING, AND HAY

Lands in the Northwest Territories are administered by the Department of Mines and Resources under the Dominion Lands Act. Homestead entries are not granted in the Northwest Territories. Unsurveyed acreage is not available for sale, and there are no large-scale farming operations established. Small tracts of unsurveyed land for fur-farming and agricultural purposes and for use in connection with fishing operations, may be obtained under lease. The application fee is \$10 and the rental per annum is 50 cents per acre, which rate is subject to revision from time to time. Leases so granted cover the surface rights only and do not give the lessee any claim to minerals. In some of the surveyed settlements lots are disposed of by sale to transportation companies, traders, and missions in connection with their undertakings, and to settlers for residential purposes. None of these lots are looked upon as having agricultural value. Lands selected for some particular purpose may be purchased after survey is made at the expense of the buyer.

Under the Timber Regulations berths and annual permits are granted for the cutting of timber subject to payment of dues. Educational, religious, and charitable institutions, however, are granted permits to cut fuelwood free of dues.

Grazing leases and permits to cut hay on vacant Crown lands may be obtained under the provisions of the Grazing and Hay Regulations.

Applications for land, timber, grazing, or hay privileges should be filed with the Agents of Dominion Lands at Fort Smith or Yellowknife, N.W.T.

## SURVEYS AND MAPS

Numerous topographical and geological maps of the Northwest Territories have been made from both aerial and ground surveys. Aerial surveys, which have been carried out by the Department of Mines and Resources in co-operation with the Department of National Defence, were first made of the main routes of water travel, and then of the areas most promising from a mineral standpoint. Topographical maps may be obtained at nominal cost from the Legal Surveys and Map Service, Surveys and Engineering Branch, and topographical and geological maps from the Bureau of Geology and Topography, Mines and Geology Branch, of the Department of Mines and Resources, Ottawa, Canada.

## GENERAL INFORMATION

Additional information concerning the administration of the natural resources of the Northwest Territories may be obtained from the District Agent and Mining Recorder at Fort Smith, the Mining Recorder at Yellowknife, or the Bureau of Northwest Territories and Yukon Affairs, Lands, Parks and Forests Branch, Department of Mines and Resources, Ottawa, Canada.

A P P E N D I X

BRIEF NOTES ON PLACES IN THE NORTHWEST TERRITORIES

and points in the Province of Quebec which  
are served by the Eastern Arctic Patrol.

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- AKLAVIK, on west channel of Mackenzie River, 69 miles from Arctic Coast, Mackenzie District, N.W.T. - Resident Government medical officer; Royal Canadian Mounted Police detachment; post office; Government radio station (Dept. of National Defence); trading posts; Church of England and Roman Catholic missions and hospitals; residential and day schools.
- AMADJUAK, southern Baffin Island, Franklin District, N.W.T. - Former trading centre. Site of Hudson's Bay Company reindeer-herding experiment, 1921.
- ARCTIC BAY, northern Baffin Island, Franklin District, N.W.T. - Winter harbour of Canadian Government steamer "Arctic", 1909-10; trading post; private commercial radio station; Church of England and Roman Catholic missions.
- ARCTIC RED RIVER, at junction of Mackenzie and Arctic Red Rivers, Mackenzie District, N.W.T. - Royal Canadian Mounted Police detachment; post office; trading post; private commercial radio station; Roman Catholic mission.
- BACHE PENINSULA, eastern Ellesmere Island, Franklin District, N.W.T. - Site of former Royal Canadian Mounted Police detachment and post office.
- BAKER LAKE, at mouth Thelon River, Keewatin District, N.W.T. - Royal Canadian Mounted Police detachment; trading post; private commercial radio station; Church of England and Roman Catholic missions.
- BELCHER ISLANDS, James Bay, Keewatin District, N.W.T. - Trading post.
- BLACKLEAD ISLAND, Cumberland Sound, Franklin District, N.W.T. - Former British whaling station; former Church of England mission.
- BOWMAN BAY, Foxe Basin, eastern Baffin Island, Franklin District, N.W.T. - One of the chief nesting grounds of the blue goose.
- BURNSIDE HARBOUR, Bathurst Inlet, Coronation Gulf, Mackenzie District, N.W.T. - Trading post; private commercial radio station; Roman Catholic mission.
- CAMBRIDGE BAY, southern Victoria Island, Franklin District, N.W.T. - Royal Canadian Mounted Police detachment; trading post, private commercial radio station; Church of England mission.
- CAPE DORSET, Dorset Island, off Foxe Peninsula, Baffin Island, Franklin District, N.W.T. - Trading posts; private commercial radio station, Roman Catholic mission.
- CAPE HOPES ADVANCE, Ungava Bay, Quebec - Government radio direction-finding and meteorological station (Dept. of Transport).



- CAPE KRUSENSTERN, Coronation Gulf, Mackenzie District, N.W.T. - Trading post.
- CAPE SMITH, Smith Island, Hudson Bay, Keewatin District, N.W.T. - Trading post; private commercial radio station.
- CHARLTON ISLAND, James Bay, Keewatin District, N.W.T. - Terminal for ocean-going vessels, connecting with railway at Moosonee, Ontario. Island leased by Hudson's Bay Company for beaver propagation purposes.
- CHESTERFIELD, western side Hudson Bay, Keewatin District, N.W.T. - Resident Government medical officer; Royal Canadian Mounted Police detachment; post office; Government radio direction-finding and meteorological station (Dept. of Transport); trading post; Roman Catholic mission, hospital, and industrial home.
- COPPERMINE, at mouth of Coppermine River, Mackenzie District, N.W.T. - Royal Canadian Mounted Police detachment; post office; Government radio station (Dept. of Transport); trading post; Church of England and Roman Catholic missions.
- CORAL HARBOUR, Southampton Island, Franklin District, N.W.T. - Royal Canadian Mounted Police detachment; trading post; private commercial radio station; Church of England and Roman Catholic missions.
- CRAIG HARBOUR, southern Ellesmere Island, Franklin District, N.W.T. - Site of former Royal Canadian Mounted Police detachment and post office.
- DUNDAS HARBOUR, Devon Island, Franklin District, N.W.T. - Site of former Royal Canadian Mounted Police detachment and post office; former trading post.
- ECLIPSE SOUND, Pond Inlet, Franklin District, N.W.T. - Lignite coal deposits.
- ESKIMO POINT, western side, Hudson Bay, Keewatin District, N.W.T. - Royal Canadian Mounted Police detachment, trading posts; private commercial radio station; Church of England and Roman Catholic missions.
- FORT CHIMO, Koksoak River, Quebec - Royal Canadian Mounted Police detachment; post office; trading post; private commercial radio station; Church of England mission.
- FORT FRANKLIN, western end Great Bear Lake, Mackenzie District, N.W.T. - Site of early Hudson's Bay Company fort used by Franklin expedition as winter headquarters 1825-26-27. At present is a trading post.
- FORT GOOD HOPE, at junction Mackenzie and Hare Rivers, Mackenzie District, N.W.T.; Royal Canadian Mounted Police detachment; post office; trading post; private commercial radio station; Roman Catholic mission.
- FORT LIARD, on Liard River, near point where Yukon-Northwest Territories boundary intersects northern boundary of British Columbia, Mackenzie District, N.W.T.; trading post; private commercial radio station; Roman Catholic mission.

- FORT MCKENZIE, Koksoak River, Quebec - Trading post; private commercial radio station; Indian settlement.
- FORT McPHERSON, on Peel River near junction with Mackenzie, Mackenzie District, N.W.T. - Post office; trading post; private commercial radio station; Church of England mission.
- FORT NORMAN, at junction of Great Bear and Mackenzie Rivers, Mackenzie District, N.W.T. - Resident Government medical officer, who is also Indian Agent; Royal Canadian Mounted Police detachment; post office; Government radio station (Dept. of National Defence); trading posts; Church of England mission and hospital; Roman Catholic mission; transfer point for all water-borne traffic proceeding to Great Bear Lake.
- FORT PROVIDENCE, on Mackenzie River just west of outlet of Great Slave Lake, Mackenzie District, N.W.T. - Royal Canadian Mounted Police detachment; post office; trading post; private commercial radio station; Roman Catholic mission and residential school.
- FORT RESOLUTION, on Great Slave Lake near mouth of Slave River, Mackenzie District, N.W.T. - Resident Government medical officer who is also Indian Agent; Royal Canadian Mounted Police detachment; post office; Government radio station (Dept. of National Defence); trading posts; Roman Catholic mission, hospital, and residential school.
- FORT ROSS, on Somerset Island, facing Bellot Strait, Franklin District, N.W.T. - Post office; trading post; private commercial radio station; Church of England mission; transfer point for freight and passengers using Northwest Passage.
- FORT SIMPSON, at junction of Mackenzie and Liard Rivers, Mackenzie District, N.W.T. - Resident Government medical officer who is also Indian Agent; Royal Canadian Mounted Police detachment; post office; Government radio station (Dept. of National Defence); landing field; trading posts; Church of England and Roman Catholic missions and day schools; Roman Catholic hospital.
- FORT SMITH, on Slave River just north of Alberta-Northwest Territories Boundary, Mackenzie District, N.W.T. - Office of District Agent, Department of Mines and Resources, and Superintendent, Wood Buffalo Park; resident Government medical officer; Royal Canadian Mounted Police detachment; post office; Government radio station (Dept. of National Defence); landing field and seaplane anchorage; trading posts; hotel; liquor store; transportation companies; Church of England and Roman Catholic missions, Roman Catholic hospital and day school; public day school.
- FRIBISHER BAY, southern Baffin Island, Franklin District, N.W.T. - Royal Canadian Mounted Police detachment; trading outpost.
- GEORGE RIVER, Ungava Bay, Quebec - Trading post; private commercial radio.
- GREAT WHALE RIVER, Hudson Bay, Quebec - Trading post; private commercial radio station; Church of England mission.



- HAY RIVER, on Great Slave Lake at mouth of Hay River, Mackenzie District, N.W.T. - Post office; trading post; private commercial radio station; Church of England and Roman Catholic missions; Church of England nursing home and day school; served by winter roads from Grimshaw, Alberta, and Fort Smith.
- HOLMAN Island, (King's Bay) Amundsen Gulf, Franklin District, N.W.T. - Trading post; private commercial radio station; Roman Catholic mission.
- HOME BAY, eastern Baffin Island, Franklin District, N.W.T. - Former trading post.
- IGLOOLIK, on island in Foxe Basin, northeast of Melville Peninsula, Franklin District, N.W.T. - Former trading post; Roman Catholic mission.
- IVUGIVIK, Hudson Bay, Quebec - Roman Catholic mission.
- KIVITOO, eastern Baffin Island, Franklin District, N.W.T. - Former trading post.
- LAKE HARBOUR, southern Baffin Island, Franklin District, N.W.T. - Royal Canadian Mounted Police detachment; post office; trading post; private commercial radio station; Church of England mission.
- LEAF RIVER, Ungava Bay, Quebec. - Former trading post.
- MANSEL ISLAND, Hudson Bay, Keewatin District, N.W.T. - Trading outpost; established as a reindeer reserve, 1920.
- NORMAN WELLS, on Mackenzie River 48 miles north of Fort Norman, Mackenzie District, N.W.T. - Oil wells, first drilled in 1920, and refinery, erected in 1939, supply most of petroleum requirements of mining camps in the Northwest Territories. Royal Canadian Mounted Police detachment; post office; landing field; trading post; private commercial radio station.
- NOTTINGHAM ISLAND, Hudson Strait, Franklin District, N.W.T. - Government radio direction-finding and meteorological station (Dept. of Transport).
- PADLEI, west of Maguse Lake, Keewatin District, N.W.T. - Trading post, serviced by seaplane from Eskimo Point; private commercial radio station.
- PADLOPING ISLAND, Exeter Bay, eastern Baffin Island, Franklin District, N.W.T. - Former rendez-vous for international fishing fleet.
- PANGNIRTUNG, on Panguit Fiord, Cumberland Sound, eastern Baffin Island, Franklin District, N.W.T. - Resident Government medical officer; Royal Canadian Mounted Police detachment; post office; trading post, private commercial radio station; Church of England mission, hospital and industrial home.
- PASLEY BAY, Boothia Peninsula, Franklin District, N.W.T. - Wintering place of Royal Canadian Mounted Police motor schooner, "St. Roch", 1941-42.



- PAULATUK, Darnley Bay, Amundsen Gulf, Mackenzie District, N.W.T. - Trading post; Roman Catholic mission.
- PAYNE BAY, Ungava Bay, Quebec - Trading post; private commercial radio station.
- PELLY BAY, Gulf of Boothia, Keewatin District, N.W.T. - Roman Catholic mission.
- PERRY RIVER, on Queen Maud Gulf, Keewatin District, N.W.T. - Trading post.
- PETERSON BAY, King William Island, Franklin District, N.W.T. - Trading post.
- POND INLET, northeastern Baffin Island, Franklin District, N.W.T. - Royal Canadian Mounted Police detachment; post office; trading post; private commercial radio station; Church of England and Roman Catholic missions.
- PORT BRABANT (Tuktoyaktuk), on Arctic Ocean east of mouth of Mackenzie River, Mackenzie District, N.W.T. - Exchange point for river and ocean traffic; trading post; private commercial radio station; Church of England and Roman Catholic missions.
- PORT BURWELL, Killinek Island, Hudson Strait, Franklin District, N.W.T. - Site of former Royal Canadian Mounted Police detachment; post office and trading post; former Moravian mission.
- PORT HARRISON, Hudson Bay, Quebec - Post office; Government radio direction-finding and meteorological station (Dept. of Transport); trading post; Church of England mission; site of former R.C.M.P. detachment.
- PORT RADIUM, Echo Bay, Great Bear Lake, Mackenzie District, N.W.T. - Settlement, now uninhabited, situated about six miles east of Eldorado Gold Mines Limited property. At the Eldorado mine there is a Royal Canadian Mounted Police detachment; post office; private commercial radio station; seaplane anchorage.
- POVUNGNITUC, Hudson Bay, Quebec - Trading post; private commercial radio station.
- RAE, at head of north arm of Great Bear Lake, Mackenzie District, N.W.T. - Royal Canadian Mounted Police detachment; post office; trading post; private commercial radio station; Roman Catholic mission and hospital.
- READ ISLAND, Dolphin and Union Strait, Franklin District, N.W.T. - Trading post; private commercial radio station.
- REINDEER DEPOT, east channel of Mackenzie River about 60 miles from mouth, Mackenzie District, N.W.T. - Headquarters for field supervision of Government reindeer industry; headquarters building, warehouses, workshop; private commercial radio station.
- RELIANCE, at eastern end of Great Slave Lake, Mackenzie District, N.W.T. - Royal Canadian Mounted Police detachment; trading post.



REPULSE BAY, southern coast Melville Peninsula, Franklin District, N.W.T. - Trading post; private commercial radio station; Roman Catholic mission.

RESOLUTION ISLAND, eastern entrance to Hudson Strait, Franklin District, N.W.T. - Government radio direction-finding and meteorological station (Dept. of Transport).

RICHARDSON ISLAND, Coronation Gulf, Franklin District, N.W.T. - Trading post.

RIVER CLYDE, eastern Baffin Island, Franklin District, N.W.T. - Trading post; private commercial radio station.

SNOWDRIFT, southwestern side Great Slave Lake, Mackenzie District, N.W.T. - Trading posts; private commercial radio station.

STANTON, at mouth Anderson River, Mackenzie District, N.W.T. - Trading post; Roman Catholic mission.

SUGLUK, Hudson Strait, Quebec - Trading posts; private commercial radio station.

TALTSON RIVER (Rocher River), southern shore Great Slave Lake, Mackenzie District, N.W.T. - Trading post; private commercial radio station.

TAVANI, Mistake Bay, western side Hudson Bay, Keewatin District, N.W.T. - Trading post; private commercial radio station; Roman Catholic mission.

WAKEHAM BAY, Hudson Strait, Quebec - Former trading post; Roman Catholic mission.

WHALE RIVER, Ungava Bay, Quebec - Former trading post.

WOLSTENHOLME (Eric Cove), at western end Hudson Strait, Quebec - Trading post; private commercial radio station.

WRIGLEY, on west bank Mackenzie River, Mackenzie District, N.W.T. - Post office; trading post; private commercial radio station; landing field.

YELLOWKNIFE, on north shore of Great Slave Lake, about five miles south of mouth of Yellowknife River, Mackenzie District, N.W.T. - Mining settlement built up as result of prospecting and mining operations in the vicinity. Contains office of Mining Recorder; Royal Canadian Mounted Police detachment; post office; Government radio station (Dept. of National Defence) public school; hotel, restaurants, bank; drug store; beer tavern; liquor store; general stores; motion picture theatre; Church of England and Roman Catholic churches; has electric light, boat, and aeroplane services.



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